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L9 ANSWER 1 OF 1 CAPLUS COPYRIGHT 2009 ACS on STN
ACCESSION NUMBER: 1998:763808 CAPLUS
DOCUMENT NUMBER: 130:117157

ENTRY DATE: Entered STN: 07 Dec 1998
 TITLE: NH radical reactions
 AUTHOR(S): Hack, W.
 CORPORATE SOURCE: Max-Planck-Institut fur Stromungsforschung, Gottingen, D-37073, Germany
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 Section cross-reference(s): 78

ABSTRACT:
 A review with 441 refs. in which reactivity of various electronic states of imidogen radical NH are discussed, in particular electronic ground state $X^3\Sigma^-$ and the first electronically excited singlet state $a^1\Delta$. Production and detection of ground state- and excited NH radicals is discussed, along with quenching of excited NH and elementary reactions of these radicals. The reactions included reactions in the N-H system (with H, H₂, N, N₂, NH, NH₃, N₂H₄), in the N-H-O system (with O, NO, H₂O, O₂, H₂O₂, OH), in the N-H-C(Si) system (with SiH₄, saturated hydrocarbons, unsatd. hydrocarbons), in the N-H-C-O system (with CO, CO₂, MeOH), in the N-H-halogen system (with HF, HCl, HCN, F₂, Cl₂, ClF).

SUPPL. TERM: review imidogen radical reaction ground state excited;
 photolysis imidogen radical reaction review

INDEX TERM: Reaction
 Reaction kinetics
 (reactions of imidogen radical in ground state)

INDEX TERM: Electronic excitation
 Electronic transition
 Photochemistry
 Photolysis
 Photolysis kinetics
 (reactions of imidogen radical in ground state and electronically excited states)

INDEX TERM: Alkanes, reactions
 Alkenes, reactions
 ROLE: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
 (reactions of imidogen radical in ground state and electronically excited states)

INDEX TERM: 67-56-1, Methanol, reactions 74-90-8, Hydrogen cyanide, reactions 124-38-9, Carbon dioxide, reactions 302-01-2, Hydrazine, reactions 630-08-0, Carbon monoxide, reactions 3352-57-6, Hydroxyl, reactions 7647-01-0, Hydrogen chloride, reactions 7664-39-3, Hydrogen fluoride, reactions 7664-41-7, Ammonia, reactions 7722-84-1, Hydrogen peroxide, reactions 7727-37-9, Nitrogen, reactions 7782-41-4, Fluorine, reactions 7782-44-7, Oxygen, reactions 7782-50-5, Chlorine, reactions 7790-89-8, Chlorine fluoride (ClF) 7803-62-5, Silane, reactions 10102-43-9, Nitrogen oxide (NO), reactions 12385-13-6, Hydrogen atom, reactions 13774-92-0, Imidogen 17778-80-2, Oxygen atom, reactions 17778-88-0, Nitrogen atom, reactions
 ROLE: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
 (reactions of imidogen radical in ground state and electronically excited states)

REFERENCE COUNT: 443 THERE ARE 443 CITED REFERENCES AVAILABLE FOR THIS RECORD.

REFERENCE(S) :

- (1) Adams, J; J Phys Chem 1991, V95, P2975 CAPLUS
- (2) Adamson, J; Phys Chem 1994, V98, P5665 CAPLUS
- (3) Alexander, M; Faraday Discuss Chem Soc 1991, V91, P319 CAPLUS
- (4) Alexander, M; J Chem Phys 1988, V89, P1388 CAPLUS
- (5) Alexander, M; J Chem Phys 1990, V93, P3307 CAPLUS
- (6) Anderson, R; Combust Flame 1982, V48, P179
- (7) Anderson, W; Chem Phys Lett 1979, V62, P275 CAPLUS
- (8) Anon; Private communication from M Olzmann 1996
- (9) Avery, H; Trans Faraday Soc 1964, V60, P335 CAPLUS
- (10) Back, R; Can J Chem 1968, V46, P1023 CAPLUS
- (11) Back, R; J Chem Phys 1964, V40, P3493 CAPLUS
- (12) Bao, X; J Phys Chem 1989, V93, P8162 CAPLUS
- (13) Baronavski, A; Chem Phys 1978, V30, P119 CAPLUS
- (14) Bayes, K; U S Clearing house Fed Sci Techn Inform Ad 1967, VAD-664, P9321
- (15) Bayes, K; Z Naturforsch 1962, V17a, P676
- (16) Becker, K; Z Naturforsch 1963, V18a, P600 CAPLUS
- (17) Becker, K; Z Naturforsch 1964, V19a, P1006 CAPLUS
- (18) Benard, D; J Phys Chem 1994, V98, P8952 CAPLUS
- (19) Benard, D; J Phys Chem 1996, V100, P8316 CAPLUS
- (20) Benrath, P; J Mol Spectrosc 1982, V95, P359
- (21) Bian, J; 21st Symp Int on Combust 1984, P575
- (22) Bian, J; 23rd Symp Int on Combust 1991, P379
- (23) Biehl, H; Chem Phys Lett 1995, V240, P369 CAPLUS
- (24) Biehl, H; J Chem Phys 1994, V101, P3819 CAPLUS
- (25) Blindauer, C; Chem Phys 1991, V150, P93 CAPLUS
- (26) Blumenstein, U; Chem Phys Lett 1984, V107, P347 CAPLUS
- (27) Boehmer, E; J Phys Chem 1995, V99, P1969 CAPLUS
- (28) Bohn, B; J Chem Phys 1992, V96, P5059 CAPLUS
- (29) Bohn, B; J Phys Chem 1993, V97, P4891 CAPLUS
- (30) Bohn, B; J Phys Chem 1993, V97, P7234 CAPLUS
- (31) Bohn, B; J Phys Chem 1995, V99, P965 CAPLUS
- (32) Bollmark, P; J Mol Spectrosc 1970, V34, P487 CAPLUS
- (33) Bondybey, V; J Chem Phys 1975, V63, P794 CAPLUS
- (34) Boudjaadar, D; J Mol Spectrosc 1986, V119, P352 CAPLUS
- (35) Bower, R; J Chem Phys 1987, V86 CAPLUS
- (36) Bozelli, J; 25th Symp Int on Combustion 1994, P965
- (37) Bradburn, G; J Phys Chem 1991, V95, P555 CAPLUS
- (38) Bradley, J; Trans Faraday Soc 1968, V64, P911 CAPLUS
- (39) Bradley, K; J Chem Phys 1995, V102, P6696
- (40) Brash, J; Can J Chem 1965, V43, P178
- (41) Brauch, M; Combust Flame 1991, V228, P1
- (42) Brazier, C; J Mol Spectrosc 1986, V120, P381 CAPLUS
- (43) Brown, S; J Chem Phys 1996, V105, P6293 CAPLUS
- (44) Brownsword, R; Chem Phys Lett 1996, V249, P162 CAPLUS
- (45) Brownsword, R; Chem Phys Lett 1996, V258, P164 CAPLUS
- (46) Canni, M; J Chem Phys 1964, V41, P3055
- (47) Caralp, F; Combust Flame 1978, V33, P299 CAPLUS
- (48) Caralp, F; J Chem Res Synop 1981, V8, P241
- (49) Carpenter, B; J Chem Phys 1984, V81, P1785 CAPLUS
- (50) Cha, H; J Phys Chem 1987, V91, P3758 CAPLUS
- (51) Cha, H; J Phys Chem 1989, V93, P235 CAPLUS
- (52) Chackerian, C; J Chem Phys 1989, V90, P641 CAPLUS
- (53) Chappell, E; J Chem Phys 1992, V97, P2400 CAPLUS
- (54) Cheah, C; J Chem Soc Faraday Trans 2 1980, V76, P1543 CAPLUS
- (55) Chen, J; J Chem Phys 1990, V93, P4033 CAPLUS
- (56) Cheung, W; Chem Phys Lett 1979, V66, P287 CAPLUS
- (57) Chou, M; J Chem Phys 1982, V76, P5334 CAPLUS
- (58) Chu, J; J Chem Phys 1990, V93, P257 CAPLUS
- (59) Clement, S; J Chem Phys 1992, V96, P4963 CAPLUS
- (60) Clements, S; Chem Soc Faraday Trans 1992, V88, P3121

- (61) Clyne, M; J Chem Soc Faraday Trans 2 1983, V79, P1515
CAPLUS
- (62) Clyne, M; J Chem Soc Faraday Trans, 2 1983, V79, P283
CAPLUS
- (63) Cohen, N; J Phys Chem Ref Data 1991, V20, P1211 CAPLUS
- (64) Collins, S; J Phys Chem 1984, V88, P4258 CAPLUS
- (65) Cornell, D; J Am Chem Soc 1966, V88, P544 CAPLUS
- (66) Cossart, D; J Chim Phys 1979, V76, P1045 CAPLUS
- (67) Cox, J; Chem Phys 1985, V96, P175 CAPLUS
- (68) Crosley, D; Combust Flame 1989, V78, P153 CAPLUS
- (69) Crosley, D; Opt Eng 1981, V20, P511 CAPLUS
- (70) Dagdigian, P; J Chem Phys 1989, V90, P6110 CAPLUS
- (71) Darvesh, K; J Phys Chem 1990, V94, P3480 CAPLUS
- (72) Davidson, D; Int J Chem Kinet 1990, V22, P513 CAPLUS
- (73) Davidson, D; Int J Chem Kinet 1990, V22, P843 CAPLUS
- (74) Davidson, J; Chemiluminescence and Bioluminescence 1973
- (75) Davis, S; J Phys Chem 1989, V93, P1078 CAPLUS
- (76) Davis, S; J Phys Chem 1990, V94, P4515 CAPLUS
- (77) de Baer, E; Chem Phys Lett 1991, V186, P40
- (78) Dean, A; The Chemistry of Combustion Processes, ACS
Symp Ser 1984, V249, P71 CAPLUS
- (79) Dekoven, B; Chem Phys Lett 1982, V86, P392 CAPLUS
- (80) Delcourt, M; Radiochem Radional Lett 1973, V13, P329
CAPLUS
- (81) Dieke, G; Phys Rev 1934, V45, P395 CAPLUS
- (82) Diesen, R; J Chem Phys 1963, V39, P2121 CAPLUS
- (83) Dixon, R; Can J Phys 1959, V37, P1171 CAPLUS
- (84) Dixon, R; Can J Phys 1960, V38, P10 CAPLUS
- (85) Dixon, R; Phil Trans Roy Soc 1960, VA252, P165
- (86) Dodd, J; J Chem Phys 1991, V94, P4301 CAPLUS
- (87) Donnelly, V; Chem Phys 1979, V43, P271 CAPLUS
- (88) Dove, J; Can J Chem 1979, V57, P689 CAPLUS
- (89) Dransfeld, P; 20th Symp Int Combust 1984, P655 CAPLUS
- (90) Dreier, T; Appl Phys 1990, VB50, P479 CAPLUS
- (91) Drozdowski, W; Chem Phys Lett 1979, V64, P421 CAPLUS
- (92) Du, K; J Phys Chem 1990, V94, P2425 CAPLUS
- (93) Du, K; J Phys Chem 1991, V95, P4728 CAPLUS
- (94) Du, K; J Phys Chem 1991, V95, P9352 CAPLUS
- (95) Du, K; J Phys Chem 1992, V96, P2553 CAPLUS
- (96) Du, K; J Phys Chem 1993, V97, P5266 CAPLUS
- (97) Durant, J; J Phys Chem 1994, V98, P518 CAPLUS
- (98) Ebenstein, I; 10th Symp Int on Combust 1965, P365
- (99) Eder, J; Deutsch Wien Adad 1893, V60, P1
- (100) Elhanine, M; Int Conf Fourier Transform Spectrosc
1992, V8, P1575
- (101) Engleking, P; J Chem Phys 1976, V65, P4323
- (102) Esser, H; Ber Bunsenges Phys Chem 1983, V87, P636
CAPLUS
- (103) Fairchild, P; Chem Phys Lett 1984, V107, P181 CAPLUS
- (104) Fell, B; J Phys Chem 1981, V85, P224 CAPLUS
- (105) Foner, S; J Chem Phys 1966, V45, P40 CAPLUS
- (106) Foner, S; J Chem Phys 1981, V74, P5017 CAPLUS
- (107) Fowler, A; Phil Trans Roy Soc 1919, VA218, P215
- (108) Foy, B; J Chem Phys 1988, V89, P608 CAPLUS
- (109) Foy, B; J Chem Phys 1989, V90, P7037 CAPLUS
- (110) Foy, B; J Chem Phys 1990, V92, P2782 CAPLUS
- (111) Freitag, F; J Phys Chem 1989, V93, P3170 CAPLUS
- (112) Fueno, F; J Am Chem Soc 1984, V106, P406
- (113) Fueno, T; Bull Chem Soc Jpn 1990, V63, P901 CAPLUS
- (114) Fueno, T; Chem Phys 1988, V124, P265 CAPLUS
- (115) Fueno, T; J Am Chem Soc 1983, V105, P5548
- (116) Fueno, T; Theor Chim Acta 1992, V82, P299 CAPLUS
- (117) Fujimoto, G; Chem Phys 1982, V65, P197 CAPLUS

- (118) Fujita, I; Z Phys Chem 1986, V149, P17 CAPLUS
- (119) Fukui, K; Bull Chem Soc Jpn 1972, V45, P2278 CAPLUS
- (120) Fukui, K; J Phys Chem 1977, V81, P1252 CAPLUS
- (121) Funke, G; Z Phys 1935, V96, P787 CAPLUS
- (122) Funke, G; Z Phys 1936, V101, P104 CAPLUS
- (123) Garland, N; J Chem Phys 1986, V85, P4970
- (124) Garland, N; J Chem Phys 1989, V90, P3566 CAPLUS
- (125) Gelernt, B; Chem Phys Lett 1975, V36, P238 CAPLUS
- (126) Gelernt, B; Chem Phys Lett 1979, V60, P261 CAPLUS
- (127) Gelernt, B; J Chem Phys 1976, V65, P4940 CAPLUS
- (128) Genich, A; Kinet Kataal 1975, V16, P841 CAPLUS
- (129) Gericke, K; Chem Phys Lett 1989, V164, P605 CAPLUS
- (130) Gericke, K; Chem Phys Lett 1991, V186, P427 CAPLUS
- (131) Gericke, K; J Chem Phys 1990, V92, P6548 CAPLUS
- (132) Gericke, K; J Chem Phys 1992, V96, P422 CAPLUS
- (133) Geunebaut, H; Compt rend 1960, V251, P1480
- (134) Glarborg, P; 24th Symp Int on Combustion 1992, P889 CAPLUS
- (135) Glowina, J; J Chem Phys 1980, V73, P4296 CAPLUS
- (136) Gmelin; Handbook on Inorganic and Organometallic Chemistry 1993, P14
- (137) Goodfried, P; Combust Flame 1965, V9, P421
- (138) Gordon, S; J Phys Chem 1971, V75, P2087 CAPLUS
- (139) Green, B; J Chem Phys 1982, V77, P3821 CAPLUS
- (140) Groth, W; J Phys Chem 1968, V72, P3914 CAPLUS
- (141) Groth, W; Z Phys Chem 1937, VB37, P312
- (142) Guadagnini, R; J Chem Phys 1995, V102, P774 CAPLUS
- (143) Guadagnini, R; J Chem Phys 1995, V102, P784 CAPLUS
- (144) Guenebaut, H; J Chim Phys 1962, V59, P970 CAPLUS
- (145) Gustafsson, O; Chem Phys Lett 1987, V138, P185 CAPLUS
- (146) Haak, H; J Phys Chem 1984, V88, P2201 CAPLUS
- (147) Haak, H; J Phys Chem 1984, V88, P3627 CAPLUS
- (148) Hack; Ber Bunsenges Phys Chem to be published 1996
- (149) Hack; to be published 1998
- (150) Hack, W; Ber Bunsenges Phys Chem 1988, V92, P620 CAPLUS
- (151) Hack, W; Ber Bunsenges Phys Chem 1994, V98 CAPLUS
- (152) Hack, W; Ber Busenges Phys Chem 1990, V94, P1304 CAPLUS
- (153) Hack, W; Gmelin Handbook of Inorganic and Organometallic Chemistry, 8th Ed 1993
- (154) Hack, W; Habilitationsschrift 1986
- (155) Hack, W; J Chem Soc Faraday Trans 2 1985, V81, P949 CAPLUS
- (156) Hack, W; J Mol Spectrosc 1990, V144, P358 CAPLUS
- (157) Hack, W; J Phys Chem 1989, V93, P3540 CAPLUS
- (158) Hack, W; J Phys Chem 1990, V94, P3636 CAPLUS
- (159) Hack, W; J Phys Chem 1990, V94, P4155 CAPLUS
- (160) Hack, W; J Phys Chem 1992, V96, P47 CAPLUS
- (161) Hack, W; J Phys Chem 1993, V97, P5599 CAPLUS
- (162) Hack, W; J Phys Chem 1995, V99, P17364 CAPLUS
- (163) Hack, W; MPI Stromforsch Report 1987, V20
- (164) Hack, W; Z Phys Chem 1989, V161, P107 CAPLUS
- (165) Hack, W; Z Phys Chem 1992, V176, P151 CAPLUS
- (166) Hack, W; Z Phys Chem 1995, V188, P275 CAPLUS
- (167) Hack, W; to be published 1998
- (168) Haines, W; Theor Chim Acta 1973, V31, P283 CAPLUS
- (169) Hall, J; J Opt Soc Amer Opt Phys 1985, VB(2), P781
- (170) Hamada, J; Bull Chem Soc Jpn 1982, V55, P1739 CAPLUS
- (171) Hamada, J; Bull Chem Soc Jpn 1983, V6, P662
- (172) Hansen, I; Chem Phys Lett 1976, V42, P370 CAPLUS
- (173) Hansen, I; NBS Spec Publ U S 526/334 1978
- (174) Hanson, R; Combustion Chemistry, chap 6 1984

- (175) Harrington, J; J Quant Spectrosc Radiat Transfer 1966, V6, P799 CAPLUS
- (176) Harrison, J; Chem Phys Lett 1986, V129, P346 CAPLUS
- (177) Harrison, J; J Chem Soc Faraday Trans 1990, V86, P3519 CAPLUS
- (178) Hawkins, W; J Phys Chem 1982, V86, P704 CAPLUS
- (179) Hawley, M; J Chem Phys 1993, V99, P2638 CAPLUS
- (180) Haynes, B; Combust Flame 1977, V28, P81 CAPLUS
- (181) He, Y; Int Chem Kinet 1991, V23, P1129 CAPLUS
- (182) Heinrich, P; Chem Phys 1995, V199, P105 CAPLUS
- (183) Heinrich, P; Chem Phys 1995, V199, P297 CAPLUS
- (184) Herbelin, J; Chem Phys Lett 1987, V133, P331 CAPLUS
- (185) Herbelin, J; Int J Chem Kinet 1984, V16, P849 CAPLUS
- (186) Hikida, T; Chem Phys 1988, V121, P63 CAPLUS
- (187) Hoffmann, G; Chem Phys Lett 1989, V155, P356 CAPLUS
- (188) Hoffmann, G; J Chem Soc Faraday Trans 2 1989, V85, P1141 CAPLUS
- (189) Hoinghaus, K; Z Naturforsch 1976, VA31, P239
- (190) Holland, R; Nature 1958, V182, P336 CAPLUS
- (191) Hori, K; Symp Shock Tubes Waves Proc 1985, V15, P261
- (192) Hoser; 14th Int Symp On Gas Kinetics, Leeds
- (193) Huang, Y; J Chem Phys 1992, V97, P180 CAPLUS
- (194) Husain, D; Proc Roy Soc 1963, VA273, P145
- (195) Jacox, M; J Am Chem Soc 1963, V85, P278 CAPLUS
- (196) Jander, J; Angew Chem 1959, V71, P626 CAPLUS
- (197) Jander, J; Z Anorg Allgem Chem 1961, V313, P37 CAPLUS
- (198) Jansen, G; Chem Phys Lett 1992, V192, P21 CAPLUS
- (199) Johnson, R; J Chem Phys 1990, V92, P6420 CAPLUS
- (200) Jordan, R; Dipl Thesis, Universitat Gottingen 1996
- (201) Kaes, A; J Chem Phys 1992, V97, P4661 CAPLUS
- (202) Kaes, A; J Chem Phys 1992, V97, P7362 CAPLUS
- (203) Kajimoto, O; Bull Chem Soc Jpn 1985, V58, P3469 CAPLUS
- (204) Kajimoto, O; Chem Phys Lett 1980, V76, P315 CAPLUS
- (205) Kajimoto, O; Chem Phys Lett 1981, V80, P484 CAPLUS
- (206) Kajimoto, O; J Phys Chem 1979, V83, P429 CAPLUS
- (207) Kajimoto, O; Kokagaku Toronkai Koen Yoshishu 1979, V1979, P276
- (208) Karin, H; Chem Phys Pocer Combust 1990, V35, P1
- (209) Kawai, J; Bull Chem Soc Jpn 1982, V55, P3312 CAPLUS
- (210) Kawai, J; Chem Lett 1983, V6, P823
- (211) Kawai, J; Chem Phys Lett 1984, V110, P655 CAPLUS
- (212) Kawai, J; Nippon Kagabu Kaishi 1984, V1, P32
- (213) Kawasaki, M; J Chem Phys 1973, V59, P648 CAPLUS
- (214) Kawasaki, M; J Phys Chem 1974, V78, P1784 CAPLUS
- (215) Kelly, P; Report UCEL-51893 1975
- (216) Kenner, R; J Chem Phys 1987, V86, P2036 CAPLUS
- (217) Kenner, R; J Chem Phys 1989, V91, P1440 CAPLUS
- (218) Kenner, R; J Phys Chem 1989, V93, P7824 CAPLUS
- (219) Kenner, R; J Phys Chem 1991, V95, P6585 CAPLUS
- (220) Kimball-Linne, M; Combust Flame 1986, V64, P337 CAPLUS
- (221) Kitamura, T; Bull Chem Soc Jpn 1981, V54, P55 CAPLUS
- (222) Kitamura, T; Kokogaku Toronkai Koen Yoshishu, Chem Soc Japan 1979, P230 CAPLUS
- (223) Kobayashi, H; J Chem Soc Faraday Trans 1995, V91, P3771 CAPLUS
- (224) Kodama, S; Bull Chem Soc Jpn 1983, V56, P2348 CAPLUS
- (225) Kodama, S; Bull Chem Soc Jpn 1983, V56, P235
- (226) Kodama, S; Bull Chem Soc Jpn 1983, V56, P2363 CAPLUS
- (227) Kodama, S; J Phys Chem 1988, V92, P19
- (228) Kodo, O; PhD Thesis, Osaka University 1982
- (229) Koffend, J; J Phys Chem 1992, V96, P9315 CAPLUS
- (230) Konar, R; Trans Faraday Soc 1971, V67, P1698 CAPLUS
- (231) Kusonoki, I; Chem Phys Lett 1976, V41, P601

- (232) Kusunoki, I; J Chem Phys 1979, V70, P699
- (233) Kusunoki, I; J Chem Phys 1979, V70, P710 CAPLUS
- (234) Lents, J; J Quant Spectrosc Radiat Transfer 1973, V13, P297 CAPLUS
- (235) Leopold, K; J Chem Phys 1986, V8, P324
- (236) Levitskii, A; Commun Symp Int Chim Plasmas 1977, V3
- (237) Lichtin, D; Chem Phys Lett 1984, V108, P18 CAPLUS
- (238) Lillich, H; 25th Symp Int on Combust 1994, P993 CAPLUS
- (239) Lin, D; J Phys Chem 1985, V89, P1561 CAPLUS
- (240) Lindberg, P; Mol Phys 1987, V62, P1297 CAPLUS
- (241) Litvak, M; Astrophys J 1982, V253, P622 CAPLUS
- (242) Luna, A; Chem Phys 1995, V196, P437 CAPLUS
- (243) Macdonald, M; J Chem Phys 1986, V84, P5513 CAPLUS
- (244) Mallins, R; J Phys Chem 1981, V85, P1342
- (245) Mantei, K; J Chem Phys 1968, V49, P3248 CAPLUS
- (246) Manz, U; J Chem Soc Faraday Trans 1991, V87, P1809
- (247) Marian, C; Chem Phys 1985, V95, P213 CAPLUS
- (248) Marshall, P; J Chem Phys 1987, V86, P5549
- (249) Masanet, J; J Photochem 1975, V3, P417 CAPLUS
- (250) Masanet, J; Photochem 1987, V36, P1 CAPLUS
- (251) Mayer, S; J Phys Chem 1968, V72, P236 CAPLUS
- (252) McDonald, J; Chem Phys 1978, V30, P133 CAPLUS
- (253) McDonald, J; Chem Phys Lett 1977, V51, P57 CAPLUS
- (254) McNesby, J; J Chem Phys 1962, V36, P605 CAPLUS
- (255) Meaburn, G; J Phys Chem 1968, V72, P1592 CAPLUS
- (256) Mebel, A; J Chem Phys 1994, V101, P3916 CAPLUS
- (257) Melius, C; ACS Symp Ser 1984, V249, P103 CAPLUS
- (258) Melius, C; J Phys Chem 1991, V95, P1410 CAPLUS
- (259) Melton, C; J Chem Phys 1966, V45, P4414 CAPLUS
- (260) Mertens, J; Int J Chem Kinet 1989, V21, P1049 CAPLUS
- (261) Mertens, J; Int J Chem Kinet 1991, V23, P173 CAPLUS
- (262) Meyer, R; Z Phys Chem 1934, VA170, P33 CAPLUS
- (263) Mill, T; Max-Planck-Inst Stromungsforsch report 1990, V14, P104
- (264) Miller, J; 24th Symp Int Combust 1992, P719 CAPLUS
- (265) Miller, J; Ann Rev Phys Chem 1990, V41, P34
- (266) Miller, J; Combust Flame 1981, V43, P81 CAPLUS
- (267) Miller, J; Prog Energy Combust Sci 1989, V15, P287 CAPLUS
- (268) Milligan, D; J Chem Phys 1964, V41, P2838 CAPLUS
- (269) Mo, Y; to be published 1998
- (270) Morgenroth, K; PhD Thesis, University Gottingen 1996
- (271) Morley, C; 18th Symp Int Combust 1981, P23
- (272) Muir, J; Can J Chem 1963, V41, P826
- (273) Nagase, S; Theoret Chim Acta Berl 1976, V4, P59
- (274) Nakamura, G; Japan J Phys 1935, V10, P5 CAPLUS
- (275) Neitsch, L; J Chem Phys 1996, V104, P1325 CAPLUS
- (276) Nelson, H; J Chem Phys 1990, V93, P8777 CAPLUS
- (277) Nelson, H; J Phys Chem 1990, V94, P3291 CAPLUS
- (278) Nieman, G; J Chem Phys 1978, V68, P5656 CAPLUS
- (279) Nip, W; PhD Thesis University of Toronto 1974
- (280) Nishi, N; Reza Kenkyn 1982, V10, P394 CAPLUS
- (281) Nishiyama, N; Chem Phys 1987, V112, P265 CAPLUS
- (282) Nishiyama, N; J Phys Chem 1986, V90, P1491 CAPLUS
- (283) Nomura, O; Chem Phys Lett 1979, V66, P523 CAPLUS
- (284) Okabe, H; J Chem Phys 1967, V47, P5241 CAPLUS
- (285) Okabe, H; J Chem Phys 1968, V49, P2726 CAPLUS
- (286) Okabe, H; J Chem Phys 1970, V53, P3507 CAPLUS
- (287) Okada, S; J Chem Phys 1993, V98, P8667 CAPLUS
- (288) Okada, S; J Chem Phys 1994, V101, P9582 CAPLUS
- (289) Ongstad, A; J Phys Chem 1988, V92, P5578 CAPLUS

- (290) Orthner, H; Diplomarbeit 1992
- (291) Pagsberg, P; J Phys Chem 1979, V83, P582 CAPLUS
- (292) Parlant, G; J Chem Phys 1991, V94, P2364 CAPLUS
- (293) Patel-Misra, D; Chem Phys Lett 1990, V174, P113 CAPLUS
- (294) Patel-Misra, D; J Chem Phys 1991, V94, P1913 CAPLUS
- (295) Patel-Misra, D; J Chem Phys 1992, V97, P4871 CAPLUS
- (296) Patel-Misra, D; J Phys Chem 1992, V96, P3232 CAPLUS
- (297) Paur, R; Int J Chem Kinet 1976, V8, P139 CAPLUS
- (298) Paur, R; J Photochem 1973, V1, P255 CAPLUS
- (299) Pears, R; Proc Roy Soc 1933, VA143, P112
- (300) Perry, R; 21st Symp Int Combust 1988, P813
- (301) Perry, R; Nature 1986, V324, P657 CAPLUS
- (302) Peterson, R; PhD Thesis, Purdue University 1981
- (303) Phillips, L; J Photochem 1983, V21, P365 CAPLUS
- (304) Piper, L; J Chem Phys 1980, V73, P791 CAPLUS
- (305) Piper, L; J Phys Chem 1987, V91, P3883 CAPLUS
- (306) Poole, P; J Chem Phys 1975, V63, P1950 CAPLUS
- (307) Pople, J; J Am Chem Soc 1983, V105, P6389 CAPLUS
- (308) Presser, N; J Phys Chem 1987, V91, P4383 CAPLUS
- (309) Pritt, A; J Chem Phys 1986, V85, P7159 CAPLUS
- (310) Puechberty, D; Combust Flame 1983, V51, P299 CAPLUS
- (311) Quandt, R; J Phys Chem 1995, V99, P1639
- (312) Quinones, E; J Phys Chem 1987, V91, P5155 CAPLUS
- (313) Quinton, A; J Chem Soc Faraday Trans 1982, V278, P1261
- (314) Radford, H; Chem Phys Lett 1975, V34, P561 CAPLUS
- (315) Rakestraw, D; 23rd Symp Int Combust 1990, P1901 CAPLUS
- (316) Ram, R; J Opt Soc Amer Opt Phys 1986, VB3, P1170
- (317) Ramsay, D; J Mol Spectrosc 1982, V93, P445 CAPLUS
- (318) Ramsay, D; J Phys Chem 1953, V57, P415 CAPLUS
- (319) Ramsthaler-Sommer, A; J Chem Phys 1986, V85, P3760
CAPLUS
- (320) Randall, R; Chem Phys Lett 1992, V200, P113 CAPLUS
- (321) Rathmann, K; Diplomarbeit, Universitat Gottingen 1988
- (322) Rathmann, K; PhD Thesis 1992
- (323) Ray, A; J Phys Chem 1993, V97, P3475 CAPLUS
- (324) Reed, R; J Chem Soc 1959, V4, P4132
- (325) Rice, F; J Am Chem Soc 1951, V73, P5529 CAPLUS
- (326) Rice, F; J Am Chem Soc 1953, V75, P548 CAPLUS
- (327) Rice, F; J Am Chem Soc 1957, V79, P1880 CAPLUS
- (328) Rice, F; J Am Chem Soc 1960, V82, P2681 CAPLUS
- (329) Richardson, W; Can J Chem 1969, V47, P2725 CAPLUS
- (330) Roby, R; Combust Flame 1987, V70, P119 CAPLUS
- (331) Rohrer, F; Chem Phys Lett 1984, V111, P234 CAPLUS
- (332) Rohrer, F; J Chem Phys 1987, V86, P226 CAPLUS
- (333) Rohrer, F; J Chem Phys 1988, V88, P4788 CAPLUS
- (334) Rohrig, M; 25th Symp Int on Combust 1994, P975
- (335) Rohrig, M; Ber Bunsenges Phys Chem 1994, V98, P1332
- (336) Rohrig, M; Ber Bunsenges Phys Chem 1994, V98, P858
- (337) Rohrig, M; Ber Bunsenges Phys Chem 1994, V98, P864
- (338) Rohrig, M; Dissertation Universitat Gottingen 1993
- (339) Romming, H; 26th Symp Int Combust, in press 1996
- (340) Roose, T; 18th Symp Int Combust 1981, P853
- (341) Roose, T; Proc Int Symp on Shock Tubes and Waves 1978,
V11, P245
- (342) Rosengren, K; J Chem Phys 1965, V43, P507 CAPLUS
- (343) Rozenberg, A; Zh Fiz Khim 1972, V46, P744 CAPLUS
- (344) Runau, R; J Mol Spec 1977, V68, P253 CAPLUS
- (345) Sakai, H; Appl Opt 1982, V21, P228 CAPLUS
- (346) Salmon, J; Western State Section of Combust Inst
Meeting 1982
- (347) Sander, W; Combust Technol 1987, V51, P103
- (348) Sanders, N; J Chem Phys 1980, V73, P5381 CAPLUS
- (349) Sasaki, S; Bull Chem Soc Japan 1986, V59, P1671 CAPLUS

- (350) Sasaki, S; Bull Chem Soc Japan 1986, V59, P1675 CAPLUS
- (351) Saunder, D; J Chem Phys 1989, V91, P5316
- (352) Sausa, R; Combust Flame 1993, V94, P407 CAPLUS
- (353) Schmidt, R; J Phys Chem 1993, V97, P3658 CAPLUS
- (354) Schmitt, J; Publ Aston Soc Pac 1969, V81, P657 CAPLUS
- (355) Schurath, U; Ber Bunsenges Phys Chem 1968, V71, P1027
- (356) Schurath, U; J Phys Chem 1969, V73, P457
- (357) Sengupta, D; J Chem Phys 1994, V101, P3906 CAPLUS
- (358) Shaw, R; Astrophys J 1936, V83, P225 CAPLUS
- (359) Shimanchi, M; Sci Light Tokyo 1966, V15, P161
- (360) Shin, S; Phil Trans R Soc 1990, VA332, P361
- (361) Simonson, M; Chem Phys Lett 1995, V244, P19 CAPLUS
- (362) Singleton, S; Chem Phys Lett 1993, V215, P237 CAPLUS
- (363) Singleton, S; J Phys Chem 1995, V99, P16296 CAPLUS
- (364) Slanger, T; J Chem Phys 1982, V77, P2432 CAPLUS
- (365) Spiglanin, T; Chem Phys Lett 1987, V141, P428 CAPLUS
- (366) Spiglanin, T; J Chem Phys 1987, V87, P1568 CAPLUS
- (367) Spiglanin, T; J Chem Phys 1987, V87, P1577 CAPLUS
- (368) Spiglanin, T; J Phys Chem 1986, V90, P6184 CAPLUS
- (369) Stedman, H; J Chem Phys 1970, V52, P3966
- (370) Stepanov, P; Vestu Mosk Univ Khim 1973, V14, P306
CAPLUS
- (371) Stephenson, J; J Chem Phys 1988, V89, P1378 CAPLUS
- (372) Stuhl, F; Z Naturforsch 1962, V17a, P676
- (373) Stuhl, F; Z Naturforsch 1963, V18a, P900 CAPLUS
- (374) Sudhakar, P; J Am Chem Soc 1991, V113, P52
- (375) Sudhakar, P; J Am Chem Soc 1993, V113, P1899
- (376) Sudhakar, P; J Org Chem 1991, V56, P6067 CAPLUS
- (377) Suzuki, T; J Chem Soc Faraday Trans 1993, V89, P995
CAPLUS
- (378) Szichman, H; A Three Dimensional Quantum Mechanical
Study of the NH+NO Reaction, to be published 1996
- (379) Tabayashi, K; J Chem Phys 1984, V80, P5335 CAPLUS
- (380) Tabayashi, K; J Chem Phys 1986, V84, P4390
- (381) Takahashi, S; Mem Def Acad, Math Phys Chem Eng 1969,
V9, P351 CAPLUS
- (382) Tennyson, P; Chem Phys 1981, V62, P171 CAPLUS
- (383) Tezaki, A; J Chem Phys 1993, V98, P3876 CAPLUS
- (384) Tezaki, A; J Phys Chem 1995, V99, P1466 CAPLUS
- (385) Tokue, I; Chem Phys 1983, V79, P383 CAPLUS
- (386) Tokue, I; Chem Phys 1984, V89, P51 CAPLUS
- (387) Tokue, I; J Phys Chem 1984, V88, P6250 CAPLUS
- (388) Tsivenko, V; Zh Fiz Khim 1973, V47, P371
- (389) Tsunashima, S; 3rd Proc Yamada Conf Free Radicals
1979, P269 CAPLUS
- (390) Tsunashima, S; Bull Chem Soc Jpn 1980, V53, P2443
CAPLUS
- (391) Tsunashima, S; Bull Chem Soc Jpn 1981, V54, P2869
CAPLUS
- (392) Tsunashima, S; Chem Phys Lett 1979, V64, P435 CAPLUS
- (393) Ubachs, W; Can J Phys 1984, V62, P1374 CAPLUS
- (394) Ubachs, W; J Mol Spectrosc 1986, V115, P88 CAPLUS
- (395) Umemoto, H; Chem Phys 1988, V125, P397 CAPLUS
- (396) Umemoto, H; Chem Phys 1988, V130, P461
- (397) Uno, K; Chem Phys Lett 1990, V166, P475 CAPLUS
- (398) van Dijk, C; J Phys Chem 1989, V93, P6363 CAPLUS
- (399) van der Heuvel, F; Chem Phys Lett 1982, V92, P215
- (400) Vanderhoff, J; 20th Symp Int Combust 1984, P1299
CAPLUS
- (401) Vanderhoff, J; Combust Flame 1991, V84, P73 CAPLUS
- (402) Vandooren, J; Chem Phys Lett 1991, V184, P294 CAPLUS
- (403) Vasconcellos, E; J Mol Spectrosc 1987, V122, P242
CAPLUS

(404) Vetter, R; J Chem Phys 1996, V104, P5558 CAPLUS
 (405) Vinogradov, I; Opt Spectrosc 1982, V53, P46 CAPLUS
 (406) Vinogradov, I; Opt Spectrosc USSR 1982, V53, P26
 (407) Vinogradov, I; Zh Fiz Khim 1977, V51, P2017 CAPLUS
 (408) Wagal, S; Chem Phys 1982, V69, P61 CAPLUS
 (409) Walch, P; J Chem Phys 1989, V91, P2939
 (410) Walch, P; J Chem Phys 1990, V93, P8063
 (411) Walch, P; J Chem Phys 1993, V98, P1170
 (412) Walch, S; J Chem Phys 1991, V95, P4277 CAPLUS
 (413) Wang, K; J Chem Phys 1992, V97, P211 CAPLUS
 (414) Wannagat, U; Z Anorg Allgem Chem 1960, V304, P276
 CAPLUS
 (415) Wategaonkar, S; Chem Phys Lett 1992, V189, P586 CAPLUS
 (416) Wayne, F; Mol Phys 1976, V32, P1407 CAPLUS
 (417) Welge, K; J Chem Phys 1966, V45, P4373 CAPLUS
 (418) Whitefield, P; Chem Phys Lett 1987, V135, P454 CAPLUS
 (419) Whittaker, F; J Phys B 1968, V1, P977
 (420) Wilms, A; PhD Thesis 1987
 (421) Wolf, M; Photochem Photobiol A: Chem 1994, V80, P85
 CAPLUS
 (422) Wu, C; J Chem Phys 1987, V86, P5584 CAPLUS
 (423) Xu, J; J Phys Chem 1995, V99, P3173 CAPLUS
 (424) Xuan, C; Chem Phys 1981, V74, P6219
 (425) Yamasaki, K; Chem Phys Lett 1993, V204, P106 CAPLUS
 (426) Yamasaki, K; J Chem Phys 1991, V95, P5087 CAPLUS
 (427) Yang, M; J Chem Phys 1995, V102, P4069 CAPLUS
 (428) Yarkony, D; J Chem Phys 1989, V91, P4745 CAPLUS
 (429) Yarkony, D; J Chem Phys 1990, V92, P320 CAPLUS
 (430) Yokoyama, K; Bull Chem Soc Jpn 1991, V64, P1731 CAPLUS
 (431) Yokoyama, K; Bull Chem Soc Jpn 1991, V64, P1738 CAPLUS
 (432) Young, R; J Chem Phys 1987, V87, P4634 CAPLUS
 (433) Zaslonko, I; Kinetiak i Katalyz 1972, V13, P745
 (434) Zetzsch, C; Ber Bunsenges Phys Chem 1976, V80, P1348
 CAPLUS
 (435) Zetzsch, C; Ber Bunsenges Phys Chem 1976, V80, P1354
 CAPLUS
 (436) Zetzsch, C; Ber Bunsenges Phys Chem 1978, V82, P830
 CAPLUS
 (437) Zetzsch, C; Ber Bunsenges Phys Chem 1981, V85, P564
 CAPLUS
 (438) Zetzsch, C; Habilitationsschrift 1977, P242
 (439) Zetzsch, C; J Chem Phys 1977, V66, P3107 CAPLUS
 (440) Zetzsch, C; J Photochem 1978, V9, P151 CAPLUS
 (441) Zhao, Y; J Chem Soc Faraday Trans 1995, V91, P2976
 (442) Zhao, Y; J Phys Chem 1994, V98, P9723 CAPLUS
 (443) Zhao, Y; J Phys Chem 1995, V99, P12179 CAPLUS

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ABSTRACT:

A review. The environmental fate of sodium azide (NaN_3) is of considerable interest, given the recent surge in production to satisfy demand for automobile air bag inflators, where it serves as the principal active ingredient. Since the mid-1990s, demand for sodium azide has exceeded 5 million kg/yr and most passenger vehicles sold in the USA now contain approx. 300 g (≈ 0.7 lb) of sodium azide. This has greatly increased the potential for accidental environmental releases and for human exposure to this highly toxic, broad-spectrum biocide. It can be argued that a new environmental threat has developed because not only are millions of kilograms of sodium azide now transported to and processed at air bag inflator factories, but also this substance is now widely distributed throughout the developed world in automobiles. Even if sodium azide were to be replaced by a more benign propellant in the future, the problem of safely disposing of large quantities of azide will remain as the vehicle fleet ages and is retired to scrap yards and shredders. Unfortunately, the environmental fate of sodium azide is unknown, so it is difficult to effectively manage releases. The problem is compounded by the fact that aqueous sodium azide is readily hydrolyzed to yield hydrazoic acid (HN_3), a volatile substance that partitions strongly to the gas phase.

SUPPL. TERM: review sodium azide automobile airbag derived environmental
fate

INDEX TERM: Automobiles
Vehicles

(airbags; environmental fate of sodium azide derived from
vehicle airbags)

INDEX TERM: Air pollution
Airbags (protective)
Environmental pollution
Human
Toxicity

(environmental fate of sodium azide derived from automobile airbags)

INDEX TERM: 26628-22-8, Sodium azide
 ROLE: POL (Pollutant); TEM (Technical or engineered material use); OCCU (Occurrence); USES (Uses)
 (environmental fate of sodium azide derived from automobile airbags)

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REFERENCE(S):

- (1) Abouelwafa, M; J Chem Soc-Dalton Trans 1986, 10, P2083 CAPLUS
- (2) Agibalov, N; Zhurnal Org Khimii 1973, V9(8), P1580
- (3) Akhavan, J; The Chemistry of Explosives 1998
- (4) Amadelli, R; J Phys Chem 1989, V93(17), P6448 CAPLUS
- (5) Anon; Personal communication
- (6) Anonymous; Driver air bag technical data sheet 1990, P1
- (7) Anonymous; End-of-life vehicle mangement, environmental defense 2002
- (8) Anonymous; Hazardous substance database 2002
- (9) Anonymous; Salt Lake Tribune Salt Lake City 1996
- (10) Anton, A; Anal Chem 1960, V32(9), P1209
- (11) Audrieth, L; Chem Rev 1934, V15, P169 CAPLUS
- (12) Bak, T; Acta Chem Scand 1957, V11(5), P901
- (13) Banerjea, D; J Indian Chem Soc 1962, V39, P353 CAPLUS
- (14) Banic, S; J Chemother 1996, V8(6), P432 CAPLUS
- (15) Banthorpe, D; Chemistry of the Azido Group 1971, P405
- (16) Barca, R; Inorg Chem 1967, V6(2), P243 CAPLUS
- (17) Basolo, F; Mechanisms of Inorganic Reactions 1967
- (18) Beck, W; Chem Ber-Recl 1967, V100(7), P2335 CAPLUS
- (19) Beckman, A; J Am Chem Soc 1928, V50, P1870 CAPLUS
- (20) Beckman, A; J Am Chem Soc 1930, V52, P124 CAPLUS
- (21) Beetlestone, J; J Chem Soc 1968, V951
- (22) Bereznitski, Y; Journal of Liquid Chromatography and Related Technologies 2001, V24, P2111 CAPLUS
- (23) Beste, C; Herbicide Handbook of the Weed Science Society of America 5 ed 1983
- (24) Betterton, E; Abstr Pap Am Chem Soc 2000, V219, P9ENVR
- (25) Betterton, E; J Air Waste Manage Assoc 1997, V47(11), P1216 CAPLUS
- (26) Betterton, E; J Air Waste Manage Assoc 1999, V49(11), P1347 CAPLUS
- (27) Biffin, M; Chemistry of the Azido Group 1971, P57 CAPLUS
- (28) Blais, M; Microchem J 1963, V7, P464 CAPLUS
- (29) Bradbury, F; Ann Appl Biol 1957, V45(2), P241
- (30) Breton, G; J Org Chem 1992, V57, P6646 CAPLUS
- (31) Budavari, S; The Merck Index, 11th ed 1989
- (32) Bunn, D; Farad Soc Trans 1961, V57(8), P1131
- (33) Burak, I; J Am Chem Soc 1965, V87(18), P4031 CAPLUS
- (34) Burak, I; J Chem Phys 1963, V39(1), P189 CAPLUS
- (35) Burak, I; J Phys Chem 1970, V74(3), P568 CAPLUS
- (36) Cochran, V; Agron J 1973, V65(4), P649
- (37) Couladouros, E; J Org Chem 1997, V62, P6 CAPLUS
- (38) Curtius, T; J Prakt Chem V43, P207 CAPLUS
- (39) Dalmia, A; J Electrochem Soc 1995, V142(11), P3735 CAPLUS
- (40) Dalmia, A; J Electrochem Soc 1996, V143(6), P1827 CAPLUS
- (41) Dalmia, A; J Electrochem Soc 1996, V143(2), P556 CAPLUS
- (42) Dean, J; Lange's Handbook of Chemistry, 14th ed 1992
- (43) Deathearage, J; J Molec Biol 1979, V134, P419
- (44) Dennis, L; J Am Chem Soc 1907, V29, P216 CAPLUS
- (45) Dinapoli, J; Vet Human Toxicol 1988, V30(4), P360

- (46) Dori, Z; Chem Rev 1973, V73(3), P247 CAPLUS
- (47) Drummond, J; Chem Commun 1969, P1373 CAPLUS
- (48) D'Orazio, L; J Phys Chem 1963, V67, P1435 CAPLUS
- (49) Edwards, W; Bag and Belt 1990
- (50) Endicott, J; J Phys Chem 1970, V74(5), P1021 CAPLUS
- (51) Epa; Report No EPA 560/11-80-011 1980
- (52) Evans, B; Chem Rev 1959, V59(4), P515
- (53) Evans, B; Proc Roy Soc Lond Ser A 1959, V250(1262), P346
- (54) Fair, H; Energetic Materials 1977
- (55) Fang, W; J Phys Chem, A 2000, V104, P4045 CAPLUS
- (56) Farhataziz; Selected specific rates constants of reactions of transients from water in aqueous solution III Hydroxyl radical and prehydroxyl radical and their radical ions 1977
- (57) Fatah, H; Chemical Week 1996, P45
- (58) Field, L; Polyhedron 1995, V14(20-21), P3133
- (59) Finlayson-Pitts, B; Atmospheric Chemistry 1986
- (60) Fortin, Y; J Bacteriol 1990, V172, P6607 CAPLUS
- (61) Gibson, Q; Biol Chem 1969, V244, P4668 CAPLUS
- (62) Golub, A; Topics in Inorganic Chemistry and General Chemistry 1986
- (63) Gosselin, R; Clinical Toxicology of Commercial Products, 5 ed 1984
- (64) Grant, W; Mutat Res-Fundam Mol Mech Mutagen 1994, V310(2), P187 CAPLUS
- (65) Gray, P; Quart Rev 1963, V17(4), P441 CAPLUS
- (66) Grolimund, D; Water Resources Res 2001, V37(3), P571
- (67) Gross, K; J Trauma-Injury Inf Crit Care 1995, V38(4), P521 MEDLINE
- (68) Gurst, J; Chemistry of the Azido Group 1971, P191 CAPLUS
- (69) Guymon, E; Sodium azide breakdown in soil 1997
- (70) Guymon, G; M S Thesis, Utah State University 1998
- (71) Haag, W; Photochem Photobiol 1987, V45, P317 CAPLUS
- (72) Hack, W; Chem Phys Lett 1999, V306(3-4), P111
- (73) Haim, A; Inorg Chem 1962, V1(3), P573
- (74) Haim, A; Inorg Chem 1962, V1(3), P583
- (75) Haim, A; Inorg Chem 1963, V2(6), P1199 CAPLUS
- (76) Haul, R; Naturwissenschaften 1944, V32, P294 CAPLUS
- (77) Helling, C; Soil Sci Soc Am J 1974, V38(1), P80 CAPLUS
- (78) Hendricks, S; J Am Chem Soc 1925, V47, P2904 CAPLUS
- (79) Hillman, M; Diss Abstr 1959, V19, P2763
- (80) Hitt, J; Clinical principles of environmental health 1992
- (81) Hofman-Bang, N; Acta Chem Scand 1964, V18(5), P1300 CAPLUS
- (82) Hoigne, J; Water Res 1985, V19(8), P993 CAPLUS
- (83) Holzwarth, J; Biochemistry 1988, V27, P6628 CAPLUS
- (84) Jacob, D; J Geophys Res 1986, V91(D9), P9807 CAPLUS
- (85) Jacobs, P; Proc Roy Soc Lond Ser A 1952, V215(1121), P254
- (86) Jobelius, H; Encyclopedia of industrial chemistry, 5th ed 1985, P193
- (87) Jones, K; Comprehensive inorganic chemistry, 1st ed 1973
- (88) Jorgensen, W; The Organic Chemist's Book of Orbitals 1973
- (89) Kage, S; J Anal Toxicol 2000, V24, P429 CAPLUS
- (90) Kelley, W; Pestic Sci 1979, V10(3), P207 CAPLUS
- (91) Ketchersid, M; Weed Sci 1976, V24(3), P312 CAPLUS
- (92) Kleinhofs, A; Mut Res 1976, V41(2-3), P233 MEDLINE
- (93) Kleinhofs, A; Mut Res 1978, V55(3-4), P165 CAPLUS

- (94) Kodama, S; Bull Chem Soc Jpn 1983, V56(8), P2348 CAPLUS
(95) Kodama, S; Bull Chem Soc Jpn 1983, V56(8), P2355 CAPLUS
(96) Kodama, S; Bull Chem Soc Jpn 1983, V56(8), P2363 CAPLUS
(97) Koldobskii, G; Uspekhi Khimii 1978, V47(11), P2044
CAPLUS
(98) Koldobskii, G; Zhurnal Org Khimii 1977, V13(5), P1026
CAPLUS
(99) Laluna, F; N Engl J Med 1979, V301(7), P382 MEDLINE
(100) Lambert, W; Ann Emerg Med 1995, V26(3), P392 MEDLINE
(101) Lederberg, J; J Bacteriol 1950, V59, P211 CAPLUS
(102) Lin, J; Arch Biochem Biophys 1999, V362, P148 CAPLUS
(103) Lin, S; J Hazard Mater 2001, V84, P217 CAPLUS
(104) Little, R; Biochemistry 1996, V35, P13780 CAPLUS
(105) Madlung, A; J Chem Educ 1996, V73(4), P347 CAPLUS
(106) Maloy, J; Standard Potentials in Aqueous Solution
1985, P127 CAPLUS
(107) Marques, H; J Chem Soc-Dalton Trans 1991, 11, P2941
CAPLUS
(108) Mason, K; Mellor's Comprehensive Treatise on Inorganic
and Theoretical Chemistry 1967, P1
(109) McDonald, J; J Chem Phys 1970, V52(3), P1332
CAPLUS
(110) Minisci, F; Tetrahedron Lett 1962, 12, P533
(111) Misra, H; Arch Biochem Biophys 1978, V189, P317 CAPLUS
(112) Miyama, H; J Electrochem Soc 1986, V133(2), P336
CAPLUS
(113) Morgan, G; Chem Soc Proc 1914, V30, P349 CAPLUS
(114) Muller; J Chem Phys 1933, V1, P482 CAPLUS
(115) Oliver, D; Proc Nat Acad Sci, USA 1990, V87, P8227
CAPLUS
(116) Ongstad, A; J Phys Chem 1989, V93(2), P549 CAPLUS
(117) Osha; Sodium azide and hydrazoic acid in workplace
atmospheres 1992
(118) Oshima, H; J AOAC Intl 2000, V83, P1410 CAPLUS
(119) Otto, M; Inorg Chem 1992, V31, P3647 CAPLUS
(120) Owais, W; Abst 210, 18th Ann Mtg Environ Mutagen Soc,
Environ Mutagen 1987, V9, P81
(121) Owais, W; Abstr Pap Am Chem Soc 1982, V184(SEP), P58
(122) Owais, W; Environ Mutagen 1983, V5(3), P448
(123) Owais, W; Environ Mutagen 1984, V6(3), P383
(124) Owais, W; Genetics 1978, V88(4), PS74
(125) Owais, W; Genetics 1979, V91(4), PS92
(126) Owais, W; Mut Res 1978, V53(3), P355 CAPLUS
(127) Owais, W; Mut Res 1979, V68(1), P15 CAPLUS
(128) Owais, W; Mut Res 1981, V91(3), P155 CAPLUS
(129) Owais, W; Mut Res 1981, V84(2), P239 CAPLUS
(130) Owais, W; Mut Res 1981, V80, P99 CAPLUS
(131) Owais, W; Mut Res 1983, V118(4), P229 CAPLUS
(132) Owais, W; Mut Res 1986, V175(3), P121 CAPLUS
(133) Owais, W; Mut Res 1988, V197(2), P313 CAPLUS
(134) Parochet, J; Weed Sci 1970, V18(5), P555
(135) Patai, S; Chemistry of the Azido Group Interscience
1971
(136) Pauling, L; Nature of the chemical bond The chemical
bond; a brief introduction to modern structural
chemistry 1967
(137) Piper, L; J Chem Phys 1980, V73(2), P791 CAPLUS
(138) Pollock, B; Energetic Materials 1977
(139) Pryor, W; Free Radic Biol Med 1995, V18(1), P75 CAPLUS
(140) Puskar, M; Amer Ind Hygiene Assoc J 1991, V52(1), P14
CAPLUS
(141) Ram, M; J Phys Chem 1986, V90, P3691 CAPLUS
(142) Reigger, H; J Am Chem Soc 1911, V33, P1569

- (143) Reiser, A; Chemistry of the Azido Group 1971, P441
CAPLUS
- (144) Resh, R; Sci Am 1996, V274(6), P116
- (145) Ricca, B; Gaz Chim Ital 1945, V75, P71
- (146) Roberson, C; Anal Chem 1957, V29(5), P854
- (147) Robinson, J; Biochemistry 1985, V24, P273
- (148) Schreck, R; J Trauma-Injury Inf Crit Care 1995,
V38(4), P528 CAPLUS
- (149) Seewald, D; Inorg Chem 1963, V2(3), P643
- (150) Seinfeld, J; Atmospheric Chemistry and Physics of Air
Pollution 1986
- (151) Shapira, D; J Phys Chem 1973, V77(10), P1195 CAPLUS
- (152) Shirokova, N; Zhurnal Org Khimii 1975, V11(9), P1805
CAPLUS
- (153) Smith, R; Crit Rev Toxicol 1994, V24(4), P355 CAPLUS
- (154) Smith, R; Critical Stability Constants 1989
- (155) Smith, R; Fundam Appl Toxicol 1991, V17(1), P120
CAPLUS
- (156) Sparrow, L; Soil Biol Biochem 1987, V19(2), P143
CAPLUS
- (157) Staples, P; J Chem Soc, A 1968, 11, P2731 CAPLUS
- (158) Stedman, G; J Chem Soc 1959, P2943 CAPLUS
- (159) Stedman, G; J Chem Soc 1959, P2949 CAPLUS
- (160) Stedman, G; J Chem Soc 1960, P1702 CAPLUS
- (161) Stryer, L; J Molec Biol 1964, V8, P96 CAPLUS
- (162) Tabani, Y; Combust Sci Technol 2000, V151, P73 CAPLUS
- (163) Templeton, J; J Am Chem Soc 1971, V93(26), P7160
CAPLUS
- (164) Treinin, A; Chemistry of the Azido Group 1971, P1
CAPLUS
- (165) Trochimowicz, H; Patty's Industrial Hygiene and
Toxicology, 4 ed 1994, P3285
- (166) Tsuge, K; J Anal Toxicol 2001, V25, P228 CAPLUS
- (167) Tuovinen, O; J Am Water Work Assoc 1981, V73(2), P126
CAPLUS
- (168) Turrentine; J Am Chem Soc 1915, V37, P1105 CAPLUS
- (169) Urbanski, T; Chemistry and Technology of Explosives
1967
- (170) Verneker, V; J Phys Chem 1968, V72(5), P1733 CAPLUS
- (171) Wallace, R; J Phys Chem 1961, V65(11), P2094
- (172) Weiss, J; Int Arch Occup Environ Health 1996, V68,
P469 MEDLINE
- (173) Westwood, L; Ion Chromatographic Analysis of
Environmental Pollutants, Ann Arbor Science, Ann
Arbor 1977, P141
- (174) Wheatley, A; Indoor Built Environ 1997, V6(3), P134
CAPLUS
- (175) Wilhelm, E; Chem Rev 1977, V77, P219 CAPLUS
- (176) Wolf, D; J Environ Qual 1989, V18(1), P39 CAPLUS
- (177) Wolf, H; Organic Reactions 1946, P307
- (178) Xu, J; Anal Chem 1998, V70(8), P1502 CAPLUS
- (179) Xu, J; Anal Chem 1999, V71(20), P4603 CAPLUS
- (180) Yoffe, A; Developments in Inorganic Nitrogen Chemistry
1966, P72 CAPLUS
- (181) Zehner, J; J Chrom Sci 1976, V14, P493 CAPLUS
- (182) Zitomer, D; Environ Sci Technol 1995, V29(3), P762
CAPLUS

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=> D L17 BIB,ABS

L17 ANSWER 1 OF 1 CAPLUS COPYRIGHT 2009 ACS on STN

AN 1915:10274 CAPLUS

DN 9:10274

OREF 9:1586d-e

TI Behavior of certain hydrazine salts on decomposition by heat

AU Turrentine, J. W.

CS Cornell Univ.

SO Journal of the American Chemical Society (1915), 37, 1105-14

CODEN: JACSAT; ISSN: 0002-7863

DT Journal

LA Unavailable

AB The decompose of hydrazine monochlorate by heat in neutral aqueous solns. yielded no HN₃; HN₃ was formed, however, in H₂SO₄ solution The corresponding di-salt yielded HN₃ both in the presence and absence of H₂O₄. The mono- and diperchlorate of N₂H₄ yielded no HN₃ either in acidified or unacidified solns. When the dry crystallized salt was decomposed by heat in a current of CO₂, HN₃ was produced from the latter but not from the former. Both yielded gaseous Cl, N and O, and Cl and OH ions. The mono- and disulfates, under similar conditions, gave off H₂O, H₂S, SO₂ and S, but no HN₃. HN₃ was not oxidized on boiling with H₂O₂ in alkaline solution; it may be separated from sulfites in this way, and this principle has been applied in a method (described) for detecting HN₃ in presence of SO₂.

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L18 1 1915:10274/RAN.CAPLUS

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L18 ANSWER 1 OF 1 CAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 2003:959696 CAPLUS

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ENTRY DATE: Entered STN: 09 Dec 2003

TITLE: Environmental fate of sodium azide derived from automobile airbags

AUTHOR(S): Betterton, Eric A.

CORPORATE SOURCE: Department of Atmospheric Sciences, University of Arizona, Tucson, AZ, 85721-0081, USA

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ABSTRACT:

A review. The environmental fate of sodium azide (NaN_3) is of considerable interest, given the recent surge in production to satisfy demand for automobile air bag inflators, where it serves as the principal active ingredient. Since the mid-1990s, demand for sodium azide has exceeded 5 million kg/yr and most passenger vehicles sold in the USA now contain approx. 300 g (≈ 0.7 lb) of sodium azide. This has greatly increased the potential for accidental environmental releases and for human exposure to this highly toxic, broad-spectrum biocide. It can be argued that a new environmental threat has developed because not only are millions of kilograms of sodium azide now transported to and processed at air bag inflator factories, but also this substance is now widely distributed throughout the developed world in automobiles. Even if sodium azide were to be replaced by a more benign propellant in the future, the problem of safely disposing of large quantities of azide will remain as the vehicle fleet ages and is retired to scrap yards and shredders. Unfortunately, the environmental fate of sodium azide is unknown, so it is difficult to effectively manage releases. The problem is compounded by the fact that aqueous sodium azide is readily hydrolyzed to yield hydrazoic acid (HN_3), a volatile substance that partitions strongly to the gas phase.

SUPPL. TERM: review sodium azide automobile airbag derived environmental fate
INDEX TERM: Automobiles
Vehicles
(airbags; environmental fate of sodium azide derived from vehicle airbags)
INDEX TERM: Air pollution
Airbags (protective)
Environmental pollution
Human
Toxicity
(environmental fate of sodium azide derived from automobile airbags)
INDEX TERM: 26628-22-8, Sodium azide
ROLE: POL (Pollutant); TEM (Technical or engineered material use); OCCU (Occurrence); USES (Uses)
(environmental fate of sodium azide derived from automobile airbags)
REFERENCE COUNT: 182 THERE ARE 182 CITED REFERENCES AVAILABLE FOR THIS RECORD.
REFERENCE(S): (1) Abouelwafa, M; J Chem Soc-Dalton Trans 1986, 10, P2083 CAPLUS
(2) Agibalov, N; Zhurnal Org Khimii 1973, V9(8), P1580
(3) Akhavan, J; The Chemistry of Explosives 1998
(4) Amadelli, R; J Phys Chem 1989, V93(17), P6448 CAPLUS
(5) Anon; Personal communication
(6) Anonymous; Driver air bag technical data sheet 1990, P1
(7) Anonymous; End-of-life vehicle mangement, environmental defense 2002
(8) Anonymous; Hazardous substance database 2002
(9) Anonymous; Salt Lake Tribune Salt Lake City 1996
(10) Anton, A; Anal Chem 1960, V32(9), P1209
(11) Audrieth, L; Chem Rev 1934, V15, P169 CAPLUS
(12) Bak, T; Acta Chem Scand 1957, V11(5), P901
(13) Banerjea, D; J Indian Chem Soc 1962, V39, P353 CAPLUS
(14) Banic, S; J Chemother 1996, V8(6), P432 CAPLUS
(15) Banthorpe, D; Chemistry of the Azido Group 1971, P405

- (16) Barca, R; Inorg Chem 1967, V6(2), P243 CAPLUS
- (17) Basolo, F; Mechanisms of Inorganic Reactions 1967
- (18) Beck, W; Chem Ber-Recl 1967, V100(7), P2335 CAPLUS
- (19) Beckman, A; J Am Chem Soc 1928, V50, P1870 CAPLUS
- (20) Beckman, A; J Am Chem Soc 1930, V52, P124 CAPLUS
- (21) Beetlestone, J; J Chem Soc 1968, V951
- (22) Bereznitski, Y; Journal of Liquid Chromatography and Related Technologies 2001, V24, P2111 CAPLUS
- (23) Beste, C; Herbicide Handbook of the Weed Science Society of America 5 ed 1983
- (24) Betterton, E; Abstr Pap Am Chem Soc 2000, V219, P9ENVR
- (25) Betterton, E; J Air Waste Manage Assoc 1997, V47(11), P1216 CAPLUS
- (26) Betterton, E; J Air Waste Manage Assoc 1999, V49(11), P1347 CAPLUS
- (27) Biffin, M; Chemistry of the Azido Group 1971, P57 CAPLUS
- (28) Blais, M; Microchem J 1963, V7, P464 CAPLUS
- (29) Bradbury, F; Ann Appl Biol 1957, V45(2), P241
- (30) Breton, G; J Org Chem 1992, V57, P6646 CAPLUS
- (31) Budavari, S; The Merck Index, 11th ed 1989
- (32) Bunn, D; Farad Soc Trans 1961, V57(8), P1131
- (33) Burak, I; J Am Chem Soc 1965, V87(18), P4031 CAPLUS
- (34) Burak, I; J Chem Phys 1963, V39(1), P189 CAPLUS
- (35) Burak, I; J Phys Chem 1970, V74(3), P568 CAPLUS
- (36) Cochran, V; Agron J 1973, V65(4), P649
- (37) Couladouros, E; J Org Chem 1997, V62, P6 CAPLUS
- (38) Curtius, T; J Prakt Chem V43, P207 CAPLUS
- (39) Dalmia, A; J Electrochem Soc 1995, V142(11), P3735 CAPLUS
- (40) Dalmia, A; J Electrochem Soc 1996, V143(6), P1827 CAPLUS
- (41) Dalmia, A; J Electrochem Soc 1996, V143(2), P556 CAPLUS
- (42) Dean, J; Lange's Handbook of Chemistry, 14th ed 1992
- (43) Deathearage, J; J Molec Biol 1979, V134, P419
- (44) Dennis, L; J Am Chem Soc 1907, V29, P216 CAPLUS
- (45) Dinapoli, J; Vet Human Toxicol 1988, V30(4), P360
- (46) Dori, Z; Chem Rev 1973, V73(3), P247 CAPLUS
- (47) Drummond, J; Chem Commun 1969, P1373 CAPLUS
- (48) D'Orazio, L; J Phys Chem 1963, V67, P1435 CAPLUS
- (49) Edwards, W; Bag and Belt 1990
- (50) Endicott, J; J Phys Chem 1970, V74(5), P1021 CAPLUS
- (51) Epa; Report No EPA 560/11-80-011 1980
- (52) Evans, B; Chem Rev 1959, V59(4), P515
- (53) Evans, B; Proc Roy Soc Lond Ser A 1959, V250(1262), P346
- (54) Fair, H; Energetic Materials 1977
- (55) Fang, W; J Phys Chem, A 2000, V104, P4045 CAPLUS
- (56) Farhataziz; Selected specific rates constants of reactions of transients from water in aqueous solution III Hydroxyl radical and prehydroxyl radical and their radical ions 1977
- (57) Fatah, H; Chemical Week 1996, P45
- (58) Field, L; Polyhedron 1995, V14(20-21), P3133
- (59) Finlayson-Pitts, B; Atmospheric Chemistry 1986
- (60) Fortin, Y; J Bacteriol 1990, V172, P6607 CAPLUS
- (61) Gibson, Q; Biol Chem 1969, V244, P4668 CAPLUS
- (62) Golub, A; Topics in Inorganic Chemistry and General Chemistry 1986
- (63) Gosselin, R; Clinical Toxicology of Commercial Products, 5 ed 1984
- (64) Grant, W; Mutat Res-Fundam Mol Mech Mutagen 1994, V310(2), P187 CAPLUS

- (65) Gray, P; Quart Rev 1963, V17(4), P441 CAPLUS
- (66) Grolimund, D; Water Resources Res 2001, V37(3), P571
- (67) Gross, K; J Trauma-Injury Inf Crit Care 1995, V38(4), P521 MEDLINE
- (68) Gurst, J; Chemistry of the Azido Group 1971, P191 CAPLUS
- (69) Guymon, E; Sodium azide breakdown in soil 1997
- (70) Guymon, G; M S Thesis, Utah State University 1998
- (71) Haag, W; Photochem Photobiol 1987, V45, P317 CAPLUS
- (72) Hack, W; Chem Phys Lett 1999, V306(3-4), P111
- (73) Haim, A; Inorg Chem 1962, V1(3), P573
- (74) Haim, A; Inorg Chem 1962, V1(3), P583
- (75) Haim, A; Inorg Chem 1963, V2(6), P1199 CAPLUS
- (76) Haul, R; Naturwissenschaften 1944, V32, P294 CAPLUS
- (77) Helling, C; Soil Sci Soc Am J 1974, V38(1), P80 CAPLUS
- (78) Hendricks, S; J Am Chem Soc 1925, V47, P2904 CAPLUS
- (79) Hillman, M; Diss Abstr 1959, V19, P2763
- (80) Hitt, J; Clinical principles of environmental health 1992
- (81) Hofman-Bang, N; Acta Chem Scand 1964, V18(5), P1300 CAPLUS
- (82) Hoigne, J; Water Res 1985, V19(8), P993 CAPLUS
- (83) Holzwarth, J; Biochemistry 1988, V27, P6628 CAPLUS
- (84) Jacob, D; J Geophys Res 1986, V91(D9), P9807 CAPLUS
- (85) Jacobs, P; Proc Roy Soc Lond Ser A 1952, V215(1121), P254
- (86) Jobelius, H; Encyclopedia of industrial chemistry, 5th ed 1985, P193
- (87) Jones, K; Comprehensive inorganic chemistry, 1st ed 1973
- (88) Jorgensen, W; The Organic Chemist's Book of Orbitals 1973
- (89) Kage, S; J Anal Toxicol 2000, V24, P429 CAPLUS
- (90) Kelley, W; Pestic Sci 1979, V10(3), P207 CAPLUS
- (91) Ketchersid, M; Weed Sci 1976, V24(3), P312 CAPLUS
- (92) Kleinhofs, A; Mut Res 1976, V41(2-3), P233 MEDLINE
- (93) Kleinhofs, A; Mut Res 1978, V55(3-4), P165 CAPLUS
- (94) Kodama, S; Bull Chem Soc Jpn 1983, V56(8), P2348 CAPLUS
- (95) Kodama, S; Bull Chem Soc Jpn 1983, V56(8), P2355 CAPLUS
- (96) Kodama, S; Bull Chem Soc Jpn 1983, V56(8), P2363 CAPLUS
- (97) Koldobskii, G; Uspekhi Khimii 1978, V47(11), P2044 CAPLUS
- (98) Koldobskii, G; Zhurnal Org Khimii 1977, V13(5), P1026 CAPLUS
- (99) Laluna, F; N Engl J Med 1979, V301(7), P382 MEDLINE
- (100) Lambert, W; Ann Emerg Med 1995, V26(3), P392 MEDLINE
- (101) Lederberg, J; J Bacteriol 1950, V59, P211 CAPLUS
- (102) Lin, J; Arch Biochem Biophys 1999, V362, P148 CAPLUS
- (103) Lin, S; J Hazard Mater 2001, V84, P217 CAPLUS
- (104) Little, R; Biochemistry 1996, V35, P13780 CAPLUS
- (105) Madlung, A; J Chem Educ 1996, V73(4), P347 CAPLUS
- (106) Maloy, J; Standard Potentials in Aqueous Solution 1985, P127 CAPLUS
- (107) Marques, H; J Chem Soc-Dalton Trans 1991, 11, P2941 CAPLUS
- (108) Mason, K; Mellor's Comprehensive Treatise on Inorganic and Theoretical Chemistry 1967, P1
- (109) McDonald, J; J Chem Phys 1970, V52(3), P1332 CAPLUS
- (110) Minisci, F; Tetrahedron Lett 1962, 12, P533
- (111) Misra, H; Arch Biochem Biophys 1978, V189, P317 CAPLUS
- (112) Miyama, H; J Electrochem Soc 1986, V133(2), P336 CAPLUS
- (113) Morgan, G; Chem Soc Proc 1914, V30, P349 CAPLUS

- (114) Muller; J Chem Phys 1933, V1, P482 CAPLUS
- (115) Oliver, D; Proc Nat Acad Sci, USA 1990, V87, P8227
CAPLUS
- (116) Ongstad, A; J Phys Chem 1989, V93(2), P549 CAPLUS
- (117) Osha; Sodium azide and hydrazoic acid in workplace
atmospheres 1992
- (118) Oshima, H; J AOAC Intl 2000, V83, P1410 CAPLUS
- (119) Otto, M; Inorg Chem 1992, V31, P3647 CAPLUS
- (120) Owais, W; Abst 210, 18th Ann Mtg Environ Mutagen Soc,
Environ Mutagen 1987, V9, P81
- (121) Owais, W; Abstr Pap Am Chem Soc 1982, V184(SEP), P58
- (122) Owais, W; Environ Mutagen 1983, V5(3), P448
- (123) Owais, W; Environ Mutagen 1984, V6(3), P383
- (124) Owais, W; Genetics 1978, V88(4), PS74
- (125) Owais, W; Genetics 1979, V91(4), PS92
- (126) Owais, W; Mut Res 1978, V53(3), P355 CAPLUS
- (127) Owais, W; Mut Res 1979, V68(1), P15 CAPLUS
- (128) Owais, W; Mut Res 1981, V91(3), P155 CAPLUS
- (129) Owais, W; Mut Res 1981, V84(2), P239 CAPLUS
- (130) Owais, W; Mut Res 1981, V80, P99 CAPLUS
- (131) Owais, W; Mut Res 1983, V118(4), P229 CAPLUS
- (132) Owais, W; Mut Res 1986, V175(3), P121 CAPLUS
- (133) Owais, W; Mut Res 1988, V197(2), P313 CAPLUS
- (134) Parochet, J; Weed Sci 1970, V18(5), P555
- (135) Patai, S; Chemistry of the Azido Group Interscience
1971
- (136) Pauling, L; Nature of the chemical bond The chemical
bond; a brief introduction to modern structural
chemistry 1967
- (137) Piper, L; J Chem Phys 1980, V73(2), P791 CAPLUS
- (138) Pollock, B; Energetic Materials 1977
- (139) Pryor, W; Free Radic Biol Med 1995, V18(1), P75 CAPLUS
- (140) Puskar, M; Amer Ind Hygiene Assoc J 1991, V52(1), P14
CAPLUS
- (141) Ram, M; J Phys Chem 1986, V90, P3691 CAPLUS
- (142) Reigger, H; J Am Chem Soc 1911, V33, P1569
- (143) Reiser, A; Chemistry of the Azido Group 1971, P441
CAPLUS
- (144) Resh, R; Sci Am 1996, V274(6), P116
- (145) Ricca, B; Gaz Chim Ital 1945, V75, P71
- (146) Roberson, C; Anal Chem 1957, V29(5), P854
- (147) Robinson, J; Biochemistry 1985, V24, P273
- (148) Schreck, R; J Trauma-Injury Inf Crit Care 1995,
V38(4), P528 CAPLUS
- (149) Seewald, D; Inorg Chem 1963, V2(3), P643
- (150) Seinfeld, J; Atmospheric Chemistry and Physics of Air
Pollution 1986
- (151) Shapira, D; J Phys Chem 1973, V77(10), P1195 CAPLUS
- (152) Shirokova, N; Zhurnal Org Khimii 1975, V11(9), P1805
CAPLUS
- (153) Smith, R; Crit Rev Toxicol 1994, V24(4), P355 CAPLUS
- (154) Smith, R; Critical Stability Constants 1989
- (155) Smith, R; Fundam Appl Toxicol 1991, V17(1), P120
CAPLUS
- (156) Sparrow, L; Soil Biol Biochem 1987, V19(2), P143
CAPLUS
- (157) Staples, P; J Chem Soc, A 1968, 11, P2731 CAPLUS
- (158) Stedman, G; J Chem Soc 1959, P2943 CAPLUS
- (159) Stedman, G; J Chem Soc 1959, P2949 CAPLUS
- (160) Stedman, G; J Chem Soc 1960, P1702 CAPLUS
- (161) Stryer, L; J Molec Biol 1964, V8, P96 CAPLUS
- (162) Tabani, Y; Combust Sci Technol 2000, V151, P73 CAPLUS
- (163) Templeton, J; J Am Chem Soc 1971, V93(26), P7160

CAPLUS
 (164) Treinin, A; Chemistry of the Azido Group 1971, P1
 CAPLUS
 (165) Trochimowicz, H; Patty's Industrial Hygiene and
 Toxicology, 4 ed 1994, P3285
 (166) Tsuge, K; J Anal Toxicol 2001, V25, P228 CAPLUS
 (167) Tuovinen, O; J Am Water Work Assoc 1981, V73(2), P126
 CAPLUS
 (168) Turrentine; J Am Chem Soc 1915, V37, P1105
 CAPLUS
 (169) Urbanski, T; Chemistry and Technology of Explosives
 1967
 (170) Verneker, V; J Phys Chem 1968, V72(5), P1733 CAPLUS
 (171) Wallace, R; J Phys Chem 1961, V65(11), P2094
 (172) Weiss, J; Int Arch Occup Environ Health 1996, V68,
 P469 MEDLINE
 (173) Westwood, L; Ion Chromatographic Analysis of
 Environmental Pollutants, Ann Arbor Science, Ann
 Arbor 1977, P141
 (174) Wheatley, A; Indoor Built Environ 1997, V6(3), P134
 CAPLUS
 (175) Wilhelm, E; Chem Rev 1977, V77, P219 CAPLUS
 (176) Wolf, D; J Environ Qual 1989, V18(1), P39 CAPLUS
 (177) Wolf, H; Organic Reactions 1946, P307
 (178) Xu, J; Anal Chem 1998, V70(8), P1502 CAPLUS
 (179) Xu, J; Anal Chem 1999, V71(20), P4603 CAPLUS
 (180) Yoffe, A; Developments in Inorganic Nitrogen Chemistry
 1966, P72 CAPLUS
 (181) Zehner, J; J Chrom Sci 1976, V14, P493 CAPLUS
 (182) Zitomer, D; Environ Sci Technol 1995, V29(3), P762
 CAPLUS

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 L19 45013 MACDONALD?/RAU

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 L20 557 MACDONALD/RAU

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 L21 33663 1932/RPY

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L22 ANSWER 1 OF 9 CAPLUS COPYRIGHT 2009 ACS on STN
 ACCESSION NUMBER: 2008:645866 CAPLUS
 DOCUMENT NUMBER: 148:555843
 ENTRY DATE: Entered STN: 30 May 2008
 TITLE: Bubbles, gating, and anesthetics in ion channels
 AUTHOR(S): Roth, Roland; Gillespie, Dirk; Nonner, Wolfgang;
 Eisenberg, Robert E.
 CORPORATE SOURCE: Max-Planck Institut fuer Metallforschung, Stuttgart,
 Germany
 SOURCE: Biophysical Journal (2008), 94(11), 4282-4298
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 LANGUAGE: English
 CLASSIFICATION: 6-7 (General Biochemistry)

ABSTRACT:

We suggest that bubbles are the bistable hydrophobic gates responsible for the on-off transitions of single channel currents. In this view, many types of channels gate by the same phys. mechanism-dewetting by capillary evaporation-but different types of channels use different sensors to modulate hydrophobic properties of the channel wall and thereby trigger and control bubbles and gating. Spontaneous emptying of channels has been seen in many simulations. Because of the physics involved, such phase transitions are inherently sensitive, unstable threshold phenomena that are difficult to simulate reproducibly and thus convincingly. We present a thermodyn. anal. of a bubble gate using morphometric d. functional theory of classical (not quantum) mechanics. Thermodyn. anal. of phase transitions is generally more reproducible and less sensitive to details than simulations. Anesthetic actions of inert gases - and their interactions with hydrostatic pressure (e.g., nitrogen narcosis) - can be easily understood by actions on bubbles. A general theory of gas anesthesia may involve bubbles in channels. Only expts. can show whether, when, or which channels actually use bubbles as hydrophobic gates: direct observation of bubbles in channels is needed. Existing expts. show thin gas layers on hydrophobic surfaces in water and suggest that bubbles nearly exist in bulk water.

SUPPL. TERM: ion channel microcapillary bubble gating switch noble gas
anesthetic

INDEX TERM: Anesthetics
(bubbles-dependent gating model for ion channels suggests
mechanism for hydrostatic pressure-associated anesthetic
action of inert gases)

INDEX TERM: Noble gases, biological studies
ROLE: BSU (Biological study, unclassified); BIOL (Biological
study)
(bubbles-dependent gating model for ion channels suggests
mechanism for hydrostatic pressure-associated anesthetic
action of inert gases)

INDEX TERM: Capillary tubes
Molecular switches
(bubbles-dependent gating model suggests ion channels
exhibit microcapillary-like behavior by switching between
water-filled conductive state and vapor-locked
nonconductive state)

INDEX TERM: Ion channels
ROLE: BSU (Biological study, unclassified); BIOL (Biological
study)
(bubbles-dependent gating model suggests ion channels
exhibit microcapillary-like behavior by switching between
water-filled conductive state and vapor-locked
nonconductive state)

INDEX TERM: Wetting
(dewetting; bubbles-dependent gating model suggests ion
channels exhibit microcapillary-like behavior by
switching between water-filled conductive state and
vapor-locked nonconductive state)

INDEX TERM: Pressure
(hydrostatic; bubbles-dependent gating model for ion
channels suggests mechanism for hydrostatic
pressure-associated anesthetic action of inert gases)

INDEX TERM: Bubbles
(microbubbles; bubbles-dependent gating model suggests
ion channels exhibit microcapillary-like behavior by
switching between water-filled conductive state and
vapor-locked nonconductive state)

INDEX TERM: 7732-18-5, Water, biological studies
ROLE: BSU (Biological study, unclassified); BIOL (Biological
study)

(bubbles-dependent gating model suggests ion channels exhibit microcapillary-like behavior by switching between water-filled conductive state and vapor-locked nonconductive state)

REFERENCE COUNT: 195 THERE ARE 195 CITED REFERENCES AVAILABLE FOR THIS RECORD.

- REFERENCE(S):
- (1) Adrian, E; The Activity of the Nerve Fibers:Nobel Lecture in Physiology or Medicine Nobel Lecture in Physiology or Medicine 1932
 - (2) Allen, R; J Chem Phys 2003, V119, P3905 CAPLUS
 - (3) Allen, R; Phys Rev Lett 2002, V89, P175502
 - (4) Anishkin, A; Biophys J 2004, V86, P2883 CAPLUS
 - (5) Anishkin, A; J Gen Physiol 2005, V125, P155 CAPLUS
 - (6) Ashford, M; Br J Pharmacol 1984, V83, P477 CAPLUS
 - (7) Baddeley, A; Ergonomics 1968, V11, P157 MEDLINE
 - (8) Bali, M; J Gen Physiol 2007, V129, P145 CAPLUS
 - (9) Barrett, J; J Physiol 1982, V331, P21
 - (10) Bass, R; Science 2002, V298, P1582 CAPLUS
 - (11) Beckstein, O; J Am Chem Soc 2004, V126, P14694 CAPLUS
 - (12) Beckstein, O; J Phys Chem B 2001, V105, P12902 CAPLUS
 - (13) Beckstein, O; Phys Biol 2006, V3, P147 CAPLUS
 - (14) Beckstein, O; Proc Natl Acad Sci USA 2003, V100, P7063 CAPLUS
 - (15) Benz, R; Biophys J 1986, V50, P91 CAPLUS
 - (16) Benz, R; Biophys J 1986, V50, P99 CAPLUS
 - (17) Benz, R; Eur Biophys J 1984, V11, P51 MEDLINE
 - (18) Berendsen, H; Intermolecular Forces 1981
 - (19) Bezanilla, F; Adv Protein Chem 2003, V63, P211 CAPLUS
 - (20) Bezanilla, F; Annu Rev Biophys Biomol Struct 1994, V23, P819 CAPLUS
 - (21) Blunck, R; J Gen Physiol 2006, V128, P569 CAPLUS
 - (22) Boda, D; Biophys J 2007, V93, P1960 CAPLUS
 - (23) Boda, D; J Chem Phys 2006, V125, P034901
 - (24) Bostick, D; PLoS Comp Biol 2007, V3, Pe22
 - (25) Burnett, W; J R Nav Med Serv 1955, V41, P188 MEDLINE
 - (26) Chandler, D; Nature 2005, V437, P640 CAPLUS
 - (27) Chandler, D; Nature 2007, V445, P831 CAPLUS
 - (28) Chen, H; Biophys J 2007, V92, P46 CAPLUS
 - (29) Chen, Y; J Am Chem Soc 2007, V129, P2414 CAPLUS
 - (30) Collins, M; Proc Natl Acad Sci USA 2005, V102, P16668 CAPLUS
 - (31) Conley, E; The Ion Channel Facts Book IV: Voltage-Gated Channels 1999
 - (32) Conti, F; Eur Biophys J 1984, V11, P137 MEDLINE
 - (33) Conti, F; J Physiol 1984, V353, P199 MEDLINE
 - (34) Decoursey, T; Physiol Rev 2003, V83, P475 CAPLUS
 - (35) Domene, C; Biophys J 2003, V85, P2787 CAPLUS
 - (36) Doyle, D; Science 1998, V280, P69 CAPLUS
 - (37) Dzubiella, J; J Chem Phys 2004, V120, P5001 CAPLUS
 - (38) Dzubiella, J; J Chem Phys 2005, V122, P234706 MEDLINE
 - (39) Eisenberg, B; Biophys Chem 2003, V100, P507 CAPLUS
 - (40) Eisenberg, R; J Membr Biol 1996, V150, P1 CAPLUS
 - (41) Eisenberg, R; Nature 1987, V325, P114
 - (42) Eisenberg, R; New Developments and Theoretical Studies of Proteins 1996
 - (43) Evans, R; Adv Phys 1979, V28, P143 CAPLUS
 - (44) Evans, R; Fundamentals of Inhomogeneous Fluids 1992
 - (45) Evans, R; J Chem Phys 1986, V84, P2376 CAPLUS
 - (46) Evans, R; J Phys Condens Matter 1990, V2, P8989
 - (47) Fatt, P; J Physiol 1952, V117, P109 MEDLINE
 - (48) Fatt, P; Nature 1950, V166, P597 MEDLINE
 - (49) Fenter, P; Prog Surf Sci 2004, V77, P171 CAPLUS
 - (50) Forsberg, E; Nanotechnology 2004, V15, PS298 CAPLUS

- (51) Freites, J; Biophys J 2006, V91, PL90 CAPLUS
- (52) Frohlich, O; J Gen Physiol 1983, V81, P127 MEDLINE
- (53) Gennes, P; Capillarity and Wetting Phenomena:Drops, Bubbles, Pearls, and Waves 2004
- (54) Gennes, P; Nobel Lectures in Physics 1991-1995 1997
- (55) Grocott, H; Eur J Anaesthesiol 2005, V22, P353 CAPLUS
- (56) Grubmuller, H; Proc Natl Acad Sci USA 2003, V100, P7421
- (57) Hainsworth, A; J Gen Physiol 1994, V104, P857 CAPLUS
- (58) Hamill, O; Pflugers Arch 1981, V391, P85 MEDLINE
- (59) Hansen, J; Theory of Simple Liquids 1986
- (60) Hansen-Goos, H; J Phys Condens Matter 2006, V18, P8413 CAPLUS
- (61) Heimburg, T; Biophys J 2007, V92, P3159 CAPLUS
- (62) Heinemann, S; Biophys J 1990, V57, P499 CAPLUS
- (63) Heinemann, S; Biophys J 1991, V60, P577 MEDLINE
- (64) Heinemann, S; J Gen Physiol 1987, V90, P765 CAPLUS
- (65) Heinemann, S; Proc Natl Acad Sci USA 1987, V84, P3229 CAPLUS
- (66) Henderson, D; Fundamentals of Inhomogeneous Fluids 1992
- (67) Henderson, D; Phys Rev E Stat Phys Plasmas Fluids Relat Interdiscip Topics 1995, V52, P758 CAPLUS
- (68) Henderson, D; Phys Rev E Stat Phys Plasmas Fluids Relat Interdiscip Topics 2000, V61, P3896 CAPLUS
- (69) Henderson, J; Phys Rev B Condens Matter 1986, V33, P614 CAPLUS
- (70) Hilf, R; Nature 2008, V452, P375 CAPLUS
- (71) Hill, A; Proc R Soc Lond B Biol Sci 1936, V119, P305
- (72) Hille, B; Ionic Channels of Excitable Membranes 2001
- (73) Hladky, S; Biochim Biophys Acta 1972, V274, P294 CAPLUS
- (74) Hladky, S; Nature 1970, V223, P451
- (75) Hodgkin, A; Arch Sci Physiol (Paris) 1949, V3, P129 CAPLUS
- (76) Hodgkin, A; Chance and Design 1992
- (77) Hodgkin, A; J Physiol 1949, V108, P37
- (78) Hodgkin, A; J Physiol 1952, V116, P424 MEDLINE
- (79) Hodgkin, A; J Physiol 1952, V116, P449 MEDLINE
- (80) Hodgkin, A; J Physiol 1952, V116, P473 MEDLINE
- (81) Hodgkin, A; J Physiol 1952, V116, P497 MEDLINE
- (82) Hodgkin, A; J Physiol 1952, V117, P500 MEDLINE
- (83) Hodgkin, A; Proc Roy Soc London B Biol Sci 1952, V140, P177 MEDLINE
- (84) Hodgkin, A; The Conduction of the Nervous Impulse 1971
- (85) Huang, X; Proc Natl Acad Sci USA 2003, V14, P11953
- (86) Hummer, G; Nature 2001, V414, P188 CAPLUS
- (87) Hummer, G; Proc Natl Acad Sci USA 2004, V101, P15330 CAPLUS
- (88) Jiang, Q; Nature 2004, V430, P806 CAPLUS
- (89) Kendig, J; Am J Physiol 1984, V246, PC84 MEDLINE
- (90) Kendig, J; Am J Physiol 1984, V246, PC91 CAPLUS
- (91) Khademi, S; Science 2004, V305, P1587 CAPLUS
- (92) Kim, Y; Proc Natl Acad Sci USA 2007, V104, P2169 CAPLUS
- (93) Konig, P; Phys Rev Lett 2004, V93, P160601
- (94) Kuo, A; Science 2003, V300, P1922 CAPLUS
- (95) Landau, L; Course of Theoretical Physics Vol 5: Statistical Physics 1996
- (96) Lev, A; Proc R Soc Lond B Biol Sci 1993, V252, P187 CAPLUS
- (97) Li, J; Proc Natl Acad Sci USA 2007, V104, P3687 CAPLUS
- (98) Lum, K; J Phys Chem B 1999, V103, P4570 CAPLUS
- (99) Macdonald, A; Eur Biophys J 2005, V34, P434 CAPLUS
- (100) Macdonald, A; FEMS Microbiol Lett 1999, V173, P327 CAPLUS
- (101) Macdonald, A; Symp Soc Exp Biol 1972, V26, P209

MEDLINE

- (102) Mackinnon, R; Angew Chem Int Ed Engl 2004, V43, P4265
CAPLUS
- (103) Magleby, K; Methods Enzymol 1992, V207, P763 CAPLUS
- (104) Maibaum, L; J Phys Chem B 2003, V107, P1189 CAPLUS
- (105) Marti, J; J Phys Chem B Cond Matter Mater Surf
Interfaces Biophys 2006, V110, P23987 CAPLUS
- (106) Matsuoka, S; J Gen Physiol 1992, V100, P963 MEDLINE
- (107) Mecke, K; Fluid Phase Equil 1998, V150, 151, P591
CAPLUS
- (108) Mecke, K; Int J Mod Phys B 1998, V12, P861
- (109) Meyer, H; Arch Exp Pathol Pharmacol 1899, V425, P109
- (110) Meyer, R; Eur Biophys J 1997, V26, P433 CAPLUS
- (111) Mezger, M; Proc Natl Acad Sci USA 2006, V103, P18401
CAPLUS
- (112) Miedema, H; Biophys J 2006, V91, P4392 CAPLUS
- (113) Miyahara, M; Langmuir 2000, V16, P4293 CAPLUS
- (114) Mullins, L; J Gen Physiol 1959, V42, P1013 MEDLINE
- (115) Mullins, L; J Gen Physiol 1959, V42, P817 CAPLUS
- (116) Mullins, L; J Gen Physiol 1968, V52, P555
- (117) Neher, E; Nature 1976, V260, P799 MEDLINE
- (118) Neimark, A; Phys Rev E Stat Phys Plasmas Fluids Relat
Interdiscip Topics 2000, V62, PR1493 CAPLUS
- (119) Netz, R; Curr Opin Colloid Interface Sci 2004, V9,
P192 CAPLUS
- (120) Nonner, W; Biophys J 2000, V79, P1976 CAPLUS
- (121) Noskov, S; J Gen Physiol 2007, V129, P135 CAPLUS
- (122) Numa, S; Ann N Y Acad Sci 1986, V479, P338 CAPLUS
- (123) Oversteegen, S; J Chem Phys 2005, V122, P214502
MEDLINE
- (124) Overton, C; Studies of Narcosis 1899
- (125) Park, C; Phys Rev Lett 2006, V97, P016101
- (126) Perozo, E; Nat Rev Mol Cell Biol 2006, V7, P109 CAPLUS
- (127) Perozo, E; Novartis Found Symp 2002, V245, P146 CAPLUS
- (128) Peter, C; Biophys J 2005, V89, P2222 CAPLUS
- (129) Pomeau, Y; Phys Today 2006, V59, P39 CAPLUS
- (130) Poynor, A; Phys Rev Lett 2006, V97, P266101
- (131) Preckel, B; Anesthesiology 2006, V105, P187
- (132) Rashevsky, N; Mathematical Biophysics 1938
- (133) Reitzenstein, S; Phys Rev Lett 2002, V89, P226804
MEDLINE
- (134) Rosenfeld, Y; Phys Rev Lett 1989, V63, P980 CAPLUS
- (135) Roth, R; J Phys Condens Matter 2002, V14, P12063
CAPLUS
- (136) Roth, R; J Phys Condens Matter 2005, V17, PS3463
CAPLUS
- (137) Roth, R; J Phys Condens Matter 2006, V18, P6517 CAPLUS
- (138) Roth, R; Phys Rev Lett 2005, V95, P247801
- (139) Roux, B; Annu Rev Biophys Biomol Struct 2005, V34,
P153 CAPLUS
- (140) Rowlinson, J; Fundamentals of Inhomogeneous Fluids
1992
- (141) Sachs, F; Biophys J 1993, V65, P1101 CAPLUS
- (142) Sakmann, B; Single Channel Recording 1995
- (143) Sanders, R; Br Med Bull 2004, V71, P115 CAPLUS
- (144) Sanders, R; Curr Opin Anaesthesiol 2005, V18, P405
- (145) Sandtner, W; Biophys J 2007, V93, PL45 CAPLUS
- (146) Sansom, M; Biophys J 1996, V70, P693 CAPLUS
- (147) Sansom, M; Biophys J 1997, V73, P2404 CAPLUS
- (148) Sansom, M; Curr Biol 2001, V11, PR71 CAPLUS
- (149) Sansom, M; Novartis Found Symp 2002, V245, P66 CAPLUS
- (150) Saparov, S; Proc Natl Acad Sci USA 2004, V101, P4805
CAPLUS

- (151) Schmalwasser, H; J Neurosci Methods 1998, V81, P1
MEDLINE
- (152) Schulten, Z; Eur Biophys J 1985, V11, P149 CAPLUS
- (153) Setny, P; J Chem Phys 2006, V125, P144717
- (154) Sigworth, F; Biophys J 1985, V47, P709 CAPLUS
- (155) Smith, P; J Gen Physiol 2002, V119, P275 CAPLUS
- (156) Southall, N; J Phys Chem B 2000, V104, P1326 CAPLUS
- (157) Sriraman, S; Phys Rev Lett 2005, V95, P130603
- (158) Stimson, L; Cell Mol Biol Lett 2005, V10, P563 CAPLUS
- (159) Stuhmer, W; Eur Biophys J 1987, V14, P131 MEDLINE
- (160) Stuhmer, W; Nature 1989, V339, P597 MEDLINE
- (161) Sukharev, S; Sci STKE 2004, V2004, Pre4
- (162) Sukharev, S; Trends Neurosci 2004, V27, P345 CAPLUS
- (163) Tata, B; Phys Rev E Stat Phys Plasmas Fluids Relat
Interdiscip Topics 2000, V62, P3875 CAPLUS
- (164) Tonner, P; Curr Opin Anaesthesiol 2006, V19, P382
- (165) Trasca, R; Phys Rev E Stat Nonlin Soft Matter Phys
2002, V65, P061607
- (166) Treptow, W; Biophys J 2006, V91, PL26 CAPLUS
- (167) Unwin, N; J Mol Biol 2002, V319, P1165 CAPLUS
- (168) Unwin, N; J Mol Biol 2005, V346, P967 CAPLUS
- (169) Unwin, N; Philos Trans R Soc Lond B Biol Sci 2000,
V355, P1813 CAPLUS
- (170) Urbic, T; J Chem Phys 2007, V127, P174505 MEDLINE
- (171) Urbic, T; J Phys Chem 2006, V110, P4963 CAPLUS
- (172) Vaitheeswaran, S; J Chem Phys 2004, V121, P7955 CAPLUS
- (173) Valiyaveetil, F; J Am Chem Soc 2006, V128, P11591
CAPLUS
- (174) Vandenberg, C; Biophys J 1991, V60, P1511 CAPLUS
- (175) Varga, S; J Colloid Interface Sci 2000, V227, P223
CAPLUS
- (176) Varma, S; Biophys J 2007, V93, P1093 CAPLUS
- (177) Waghe, A; J Chem Phys 2002, V117, P10789 CAPLUS
- (178) Wang, J; J Membr Biol 1992, V130, P163 CAPLUS
- (179) Wang, Y; Biophys J 2005, V89, P256 CAPLUS
- (180) Wang, Y; J Nutr 2007, V137, PS1509
- (181) Wann, K; Prog Neurobiol 1988, V30, P271 CAPLUS
- (182) Weeks, J; Annu Rev Phys Chem 2002, V53, P533 CAPLUS
- (183) Wesstrom, J; Phys Rev Lett 1999, V82, P2564 CAPLUS
- (184) Wikstrom, M; Biochim Biophys Acta 2003, V1604, P61
CAPLUS
- (185) Worschech, L; Phys Lett 2001, V79, P3287 CAPLUS
- (186) Wu, Y; J Chem Phys 2002, V117, P10156
- (187) Yang, N; Neuron 1995, V15, P213 CAPLUS
- (188) Yin, H; J Am Chem Soc 2007, V129, P7369 CAPLUS
- (189) Youngson, A; Br J Anaesth 1970, V42, P801 MEDLINE
- (190) Zagotta, W; J Gen Physiol 1994, V103, P321 CAPLUS
- (191) Zhang, Y; J Gen Physiol 2006, V128, P185 CAPLUS
- (192) Zhou, Y; Nature 2001, V414, P43 CAPLUS
- (193) Zimmerberg, J; Biophys J 1990, V57, P1049 MEDLINE
- (194) Zimmerberg, J; Nature 1986, V323, P36 CAPLUS
- (195) Zimmerberg, J; Nature 1987, V325, P114

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ABSTRACT:

A review on ascorbic acid (vitamin C), including its chemical and food sources. The history of ascorbic acid is discussed, along with its nomenclature and structure, phys. and chemical properties, chemical and biol. synthesis, biochem. functions, relationship with glutathione, role as an antioxidant, link with gene expression, and metabolism and regulation. The selected clin. features important to ascorbic acid status are examined, together with progression of selected chronic diseases, ascorbic acid requirements, allowances, and upper limits, iron-related disorders, and vitamin B12.

SUPPL. TERM: review ascorbic acid antioxidant chronic disease nutrition

INDEX TERM: Disease, animal

(chronic; poor ascorbic acid status was related to atherosclerosis, cataract, cancer and worsening of respiratory function in smoker and elderly patient)

INDEX TERM: Aging, animal

(elderly; poor ascorbic acid status was related to atherosclerosis, cataract and worsening of respiratory function in smoker and elderly patient)

INDEX TERM: Antioxidants

Atherosclerosis

Cataract

Human

Metabolism, animal

Nutrition, animal

(poor ascorbic acid status was related to atherosclerosis, cataract and worsening of respiratory function in smoker and elderly patient)

INDEX TERM: Neoplasm

(poor ascorbic acid status was related to atherosclerosis, cataract, cancer and worsening of respiratory function in smoker and elderly patient)

INDEX TERM: Scurvy

(poor ascorbic acid status was related to atherosclerosis, scurvy, cataract and worsening of respiratory function in smoker and elderly patient)

INDEX TERM: 50-81-7, Ascorbic acid, biological studies 70-18-8, Glutathione, biological studies

ROLE: BSU (Biological study, unclassified); BIOL (Biological study)

(poor ascorbic acid status was related to atherosclerosis, cataract and worsening of respiratory function in smoker and elderly patient)

REFERENCE COUNT: 246 THERE ARE 246 CITED REFERENCES AVAILABLE FOR THIS RECORD.

REFERENCE(S): (1) Aleffi, S; Hepatology 2005, V42, P1339 CAPLUS
(2) Ames, B; Environ Health Perspect 1993, V101(Suppl 5), P35
(3) Anderson, R; Am J Clin Nutr 1890, V33, P71
(4) Anderson, R; Am J Clin Nutr 1981, V34, P1906 CAPLUS
(5) Anderson, R; Clin Exp Immunol 1981, V43, P180 MEDLINE
(6) Anderson, R; S Afr Med J 1979, V56, P394 CAPLUS
(7) Andrews, G; Ascorbic Acid:Chemistry, Metabolism, and Uses Advances in Chemistry Series 1982, P59 CAPLUS
(8) Anon; Hematological and nutritional biochemistry reference data for persons 6 months-74 years of age:United States, 1976-80 1984, V83, P138

- (9) Arrigoni, O; Biochim Biophys Acta 2002, V1569, P1 CAPLUS
- (10) Asard, H; Vitamin C: Function and Biochemistry in Animals and Plants 2004, P1
- (11) Auer, B; Eur J Clin Invest 1998, V28, P695 CAPLUS
- (12) Banhegyi, G; J Biol Chem 1998, V273, P2758 CAPLUS
- (13) Baxmann, A; Kidney Int 2003, V63, P1066 CAPLUS
- (14) Behrens, W; J Liquid Chromatogr 1994, V17, P2445 CAPLUS
- (15) Benzie, I; Clin Chim Acta 1995, V239, P185 CAPLUS
- (16) Berlett, B; J Biol Chem 1997, V272, P20313 CAPLUS
- (17) Betanzos-Cabrera, G; J Virol Methods 2004, V120, P161 CAPLUS
- (18) Bielski, B; Ascorbic Acid:Chemistry, Metabolism, and Uses Advances in Chemistry Series 1982, P81 CAPLUS
- (19) Bielski, B; J Am Chem Soc 1981, V103, P3516 CAPLUS
- (20) Blanchard, J; Eur J Clin Nutr 1989, V43, P97 MEDLINE
- (21) Block, G; J Am Coll Nutr 1999, V18, P628 CAPLUS
- (22) Blot, W; J Natl Cancer Inst 1993, V85, P148
- (23) Bodner, C; Eur Respir J 1999, V13, P22 MEDLINE
- (24) Bors, W; Vitamin C in Health and Disease 1997
- (25) Bown, S; Scurvy 2005, P1
- (26) Boxer, L; N Engl J Med 1976, V295, P1041 MEDLINE
- (27) Braun, L; FEBS Lett 1996, V390, P183 CAPLUS
- (28) Braun, L; Free Radic Biol Med 1997, V23, P804 CAPLUS
- (29) Brown, B; Arterioscler Thromb Vasc 2002, V22, P1535 CAPLUS
- (30) Bucca, C; Ann Allergy 1990, V65, P311 MEDLINE
- (31) Buettner, G; Arch Biochem Biophys 1993, V300, P535 CAPLUS
- (32) Campbell, G; Ann Intern Med 1975, V82, P810
- (33) Campbell, J; Cell Immunol 1999, V194, P1 CAPLUS
- (34) Carcamo, J; Biochemistry 2002, V41, P12995 CAPLUS
- (35) Carinci, F; Arch Oral Biol 2005, V50, P481 CAPLUS
- (36) Carpenter, K; The History of Scurvy and Vitamin C 1986, P1
- (37) Carr, A; Am J Clin Nutr 1999, V69, P1086 CAPLUS
- (38) Carr, A; Circ Res 2000, V87, P349 CAPLUS
- (39) Carr, A; FASEB J 1999, V13, P1007 CAPLUS
- (40) Chatterjee, I; Science 1973, V182, P1271
- (41) Chatterjee, I; Ann NY Acad Sci 1975, V258, P24 CAPLUS
- (42) Chen, H; Am J Physiol Heart Circ Physiol 2006, V290, PH137 CAPLUS
- (43) Chojkier, M; J Biol Chem 1989, V264, P16957 CAPLUS
- (44) Chotani, G; Biochim Biophys Acta 2000, V1543, P434 CAPLUS
- (45) Cochrane, W; Can Med Assoc J 1965, V93, P893 MEDLINE
- (46) Crawford, T; Ascorbic Acid:Chemistry, Metabolism, and Uses Advances in Chemistry Series 1982, P1 CAPLUS
- (47) Critchfield, J; J Nutr 1985, V115, P70 CAPLUS
- (48) Dahl, G; J Clin Hospital Pharm 1986, V11, P271 CAPLUS
- (49) Davidson, J; J Biol Chem 1997, V272, P345 CAPLUS
- (50) Dean, R; Biochem J 1997, V324, P1 CAPLUS
- (51) Dickinson, V; J Am Coll Nutr 1994, V13, P22 MEDLINE
- (52) Djoman, M; J Biomol Struct Dyn 1998, V15, P1115 CAPLUS
- (53) Douglas, R; Cochrane Database Syst Rev 2004, V18
- (54) Douziech, N; Exp Gerontol 2002, V37, P369 CAPLUS
- (55) Drummond, J; Biochem J 1920, V14, P660 CAPLUS
- (56) Duffy, S; Lancet 1999, V354, P2048 CAPLUS
- (57) Ellis, G; J Cardiovasc Pharmacol 2001, V37, P564 CAPLUS
- (58) Englard, S; Am J Clin Nutr 1986, V54, P1173S
- (59) Englard, S; Annu Rev Nutr 1986, V6, P365 CAPLUS
- (60) Enstrom, J; Epidemiology 1992, V3, P194 MEDLINE
- (61) Erichsen, H; J Nutr 2001, V131, P2623 CAPLUS
- (62) Ervin, R; Dietary intake of selected vitamins for the

- United States population:1999-2000 Advance Data;
Vital and Health Statistics 2004, 339
- (63) Fischer, H; Proc Natl Acad Sci, USA 2004, V101, P3691
CAPLUS
 - (64) Food And Nutrition Board; Dietary Reference Intakes
1998
 - (65) Fraga, C; Mutat Res 1996, V351, P199
 - (66) Fraga, C; Proc Natl Acad Sci, USA 1991, V88, P11003
CAPLUS
 - (67) Freemantle, J; Clin Chem 1994, V40, P950 MEDLINE
 - (68) Frenich, A; J Agric Food Chem 2005, V53, P7371 CAPLUS
 - (69) Gale, C; Br Med J 1995, V310, P1563 MEDLINE
 - (70) Garcia, M; Glia 2005, V50, P32
 - (71) Geesin, J; Arch Biochem Biophys 1991, V290, P127 CAPLUS
 - (72) Gensler, M; J Agric Food Chem 1995, V43, P2662 CAPLUS
 - (73) Gispert, S; DNA Res 2000, V7, P339 CAPLUS
 - (74) Goetzl, E; Ann Rheum Dis 1976, V35, P510 CAPLUS
 - (75) Goetzl, E; J Clin Invest 1974, V53, P813 CAPLUS
 - (76) Goldblith, S; Milestones in Nutrition 1964, P331
 - (77) Goldenberg, H; J Bioenerg Biomembr 1994, V26, P359
CAPLUS
 - (78) Goldschmidt, M; Am J Clin Nutr 1991, V54, P1214S CAPLUS
 - (79) Grollman, A; Arch Biochem Biophys 1957, V69, P458
CAPLUS
 - (80) Halliwell, B; Free Radic Res 1996, V25, P439 CAPLUS
 - (81) Halliwell, B; Vitamin C in Health and Disease 1997, P25
 - (82) Hamabe, A; Am J Cardiol 2001, V87, P1154 CAPLUS
 - (83) Hampl, J; Am J Public Health 2004, V94, P870
 - (84) Harakeh, S; Am J Clin Nutr 1991, V54, P1231S CAPLUS
 - (85) Hartel, C; Cytokine 2004, V27, P101 CAPLUS
 - (86) Hatch, G; Am J Clin Nutr 2002, V61(Suppl), P625S
 - (87) Heart Protection Study Collaborative Group; Lancet
2002, V360, P23 CAPLUS
 - (88) Heller, R; J Biol Chem 2001, V276, P40 CAPLUS
 - (89) Hemila, H; Br J Nutr 1997, V77, P59 CAPLUS
 - (90) Hemila, H; Int J Sports Med 1996, V17, P379 CAPLUS
 - (91) Hemila, H; Military Med 2004, V169, P920
 - (92) Herbert, V; Am J Clin Nutr 1978, V31, P253 CAPLUS
 - (93) Hirst, E; Biochem J 1933, V27, P1271 CAPLUS
 - (94) Hodis, H; Circulation 2002, V106, P1453 CAPLUS
 - (95) Holst, A; J Hygiene 1907, V7, P634
 - (96) Horio, F; J Nutr 1986, V116, P2278 CAPLUS
 - (97) Houglum, K; Am J Clin Nutr 1991, V54, P1141S CAPLUS
 - (98) Houglum, K; J Clin Invest 1991, V87, P2230 CAPLUS
 - (99) Hu, G; Am J Epidemiol 2000, V151, P975 MEDLINE
 - (100) Hunt, C; Int J Vitam Nutr Res 1994, V64, P212 MEDLINE
 - (101) Hunt, J; Am J Clin Nutr 2004, V80, P924 CAPLUS
 - (102) Jacob, R; Am J Clin Nutr 1987, V46, P818 CAPLUS
 - (103) Jacob, R; Am J Clin Nutr 1988, V48, P1436 CAPLUS
 - (104) Jacob, R; Am J Clin Nutr 1991, V54, P1302S CAPLUS
 - (105) Jacobs, E; Cancer Epidemiol Biomarkers Prev 2001, V10,
P17 MEDLINE
 - (106) Jacobs, E; Cancer Epidemiol Biomarkers Prev 2002, V11,
P35 CAPLUS
 - (107) Jacques, P; Am J Clin Nutr 1991, V53, P325S
 - (108) Jacques, P; Am J Clin Nutr 1997, V66, P911 MEDLINE
 - (109) Jialal, I; Am J Clin Nutr 2006, V83, P525 CAPLUS
 - (110) Johnston, C; J Am Coll Nutr 1992, V11, P172 CAPLUS
 - (111) Johnston, C; J Am Coll Nutr 1996, V15, P586 CAPLUS
 - (112) Johnston, C; J Am Coll Nutr 1996, V15, P586 CAPLUS
 - (113) Johnston, C; J Am Diet Assoc 1992, V92, P988 CAPLUS
 - (114) Johnston, C; J Nutr 1987, V117, P764 CAPLUS
 - (115) Johnston, C; J Nutr Biochem 1991, V2, P499 CAPLUS

- (116) Kallner, A; Am J Clin Nutr 1988, V47, P340 CAPLUS
- (117) Kampfenkel, K; Anal Biochem 1995, V225, P165 CAPLUS
- (118) Karanth, S; Proc Natl Acad Sci, USA 2000, V97, P1891
CAPLUS
- (119) Kashiba, M; Free Radic Biol Med 2002, V33, P1221
CAPLUS
- (120) Kawai, T; J Biol Chem 1992, V267, P21973 CAPLUS
- (121) Kay, N; Am J Clin Nutr 1982, V36, P127 MEDLINE
- (122) Khaw, K; Lancet 2001, V35, P657
- (123) Kimoto, E; Methods Enzymol 1997, V279, P3 CAPLUS
- (124) Knekt, P; Am J Clin Nutr 2004, V80, P1508 CAPLUS
- (125) Krause, R; Eur J Clin Invest 2001, V31, P258 CAPLUS
- (126) Kurl, S; Stroke 2002, V33, P1568 CAPLUS
- (127) Lee, C; Carbohydrate Res 1978, V67, P127 CAPLUS
- (128) Lee, K; Am J Clin Nutr 2003, V78, P1074 CAPLUS
- (129) Leveille, S; J Epidemiol Commun Health 1999, V51, P479
- (130) Levine, M; Proc Natl Acad Sci, USA 1996, V93, P3704
CAPLUS
- (131) Liang, W; Am J Physiol Cell Physiol 2002, V283, PC1696
CAPLUS
- (132) Lind, J; A Treatise of the Scurvy in Three Parts
Containing an inquiry into the Nature, Causes and
Cure of that Disease, together with a Critical and
Chronological View of what has been published on
the subject 1753
- (133) Lindahl, T; Nature 1993, V362, P709 CAPLUS
- (134) Liu, T; Clin Chem 1982, V28, P2225 CAPLUS
- (135) Lorenz, A; J Am Diet Assoc 1954, V30, P665 MEDLINE
- (136) Lorenz, A; J Hist Med Allied Sci 1957, V7, P501
- (137) Lutsenko, E; J Biol Chem 2002, V277, P16895 CAPLUS
- (138) Macdonald, H; Am J Clin Nutr 2004, V79, P155
CAPLUS
- (139) Macdonald, L; Br J Nutr 2002, V87, P97 CAPLUS
- (140) Maeda, N; Proc Natl Acad Sci, USA 2000, V97, P841
CAPLUS
- (141) Mannick, E; Cancer Res 1996, V56, P3238 CAPLUS
- (142) Margolis, S; Clin Chem 1996, V42, P1257 CAPLUS
- (143) Martensson, J; Proc Natl Acad Sci, USA 1991, V88,
P4656 MEDLINE
- (144) Martensson, J; Proc Natl Acad Sci, USA 1992, V89,
P11566 CAPLUS
- (145) Martensson, J; Proc Natl Acad Sci, USA 1993, V90, P317
CAPLUS
- (146) Mashour, S; Chest 2000, V118, P561 MEDLINE
- (147) May, J; Arch Biochem Biophys 1998, V349, P281 CAPLUS
- (148) Mayne, S; Cancer Epidemiol Biomarkers Prev 2001, V10,
P1055 CAPLUS
- (149) McGown, E; Anal Biochem 1982, V119, P55 CAPLUS
- (150) McKeever, T; Am J Respir Crit Care Med 2002, V165,
P1299
- (151) Meister, A; Biochem Pharmacol 1992, V44, P1905 CAPLUS
- (152) Meister, A; Biochim Biophys Acta 1995, V1271, P35
- (153) Meister, A; Cancer Res 1994, V54, P1969s CAPLUS
- (154) Meister, A; J Biol Chem 1994, V269, P9397 CAPLUS
- (155) Meister, A; J Natl Cancer Inst 1992, V84, P1601
MEDLINE
- (156) Meister, A; J Nutr Sci, Vitaminol (Tokyo) 1992, P1
MEDLINE
- (157) Melhus, H; J Bone Miner Res 1999, V14, P129 MEDLINE
- (158) Miyazaki, T; Appl Environ Microbiol 2006, V72, P1487
CAPLUS
- (159) Moeller, S; J Nutr 2004, V134, P1812 CAPLUS
- (160) Moeslinger, T; Clin Chem 1995, V41, P1177 CAPLUS

- (161) Morton, D; J Bone Miner Res 2001, V16, P135 CAPLUS
- (162) Mudway, I; Occup Environ Med 1999, V56, P473 CAPLUS
- (163) Mullan, B; Hypertension 2002, V40, P804 CAPLUS
- (164) Muller, F; Eur J Clin Invest 2000, V30, P905 CAPLUS
- (165) Mustacich, D; Biochem J 2000, V346(Pt 1), P1
- (166) Naidu, K; Nutr J 2003, V2, P7
- (167) Nieman, D; Int J Sport Nutr 1997, V7, P173 CAPLUS
- (168) Nieman, D; Int J Sports Med 2003, V24, P541 CAPLUS
- (169) Nieman, D; Med Sci Sports Exerc 2000, V32(Suppl),
PS406
- (170) Niki, E; Vitamin C in Health and Disease 1997, P183
CAPLUS
- (171) Nyyssonen, K; Br Med J 1997, V314, P634 MEDLINE
- (172) Oh, C; J Nutr 1988, V118, P639 CAPLUS
- (173) Omaye, S; Am J Clin Nutr 1989, V44, P257
- (174) Omaye, S; Ann NY Acad Sci 1987, V498, P389 CAPLUS
- (175) Omenaas, E; Respir Med 2003, V97, P134 MEDLINE
- (176) Ortwerth, B; Vitamin C in Health and Disease 1997,
P123 CAPLUS
- (177) Padayatt, S; Ann Intern Med 2004, V140, P533
- (178) Palmer, F; Eur J Appl Physiol 2003, V89, P100 CAPLUS
- (179) Panush, R; Int J Vit Nutr Res 1982, V23(Suppl), P35
- (180) Parola, M; Biochem Biophys Res Commun 1993, V194,
P1044 CAPLUS
- (181) Patak, P; Endocrine Res 2004, V30, P871 CAPLUS
- (182) Pauling, L; Vitamin C and the Common Cold 1970
- (183) Peters, E; Am J Clin Nutr 1993, V57, P170 CAPLUS
- (184) Powis, G; Free Radic Biol Med 2000, V29, P312 CAPLUS
- (185) Prigge, S; Cell Mol Life Sci 2000, V57, P1236 CAPLUS
- (186) Prigge, S; Nat Struct Biol 1999, V6, P976 CAPLUS
- (187) Prigge, S; Science 1997, V278, P1300 CAPLUS
- (188) Puskas, F; Antioxid Redox Signal 2002, V4, P357 CAPLUS
- (189) Puskas, F; FASEB J 2000, V14, P1352 CAPLUS
- (190) Quagliano, D; Eur J Cell Biol 1991, V54, P18 MEDLINE
- (191) Rayment, S; Biochem Biophys Res Commun 2003, V308,
P339 CAPLUS
- (192) Rebouche, C; Am J Clin Nutr 1991, V54, P1147S CAPLUS
- (193) Reiser, K; FASEB J 1992, V6, P2439 CAPLUS
- (194) Reller, K; Ann NY Acad Sci 1998, V850, P463 MEDLINE
- (195) Riemersma, R; Am J Clin Nutr 2000, V71, P1181 CAPLUS
- (196) Roscetti, G; J Neurochem 1998, V71, P1108 CAPLUS
- (197) Rucker, R; Am J Clin Nutr 1980, V33, P961 CAPLUS
- (198) Rucker, R; Biochem Mol Biol Educ 2002, V30, P86 CAPLUS
- (199) Rucker, R; FASEB J 1988, V2, P2252 CAPLUS
- (200) Rucker, R; J Nutr 1993, V123, P977 CAPLUS
- (201) Rumey, S; J Nutr Biochem 1998, V9, P116
- (202) Sakagami, H; Free Radic Biol Med 1998, V25, P1013
CAPLUS
- (203) Salonen, R; Circulation 2003, V107, P947 CAPLUS
- (204) Sandler, J; J Cell Biol 1975, V67, P480 CAPLUS
- (205) Schectman, G; Am J Clin Nutr 1991, V53, P1466 MEDLINE
- (206) Schunemann, H; Am J Epidemiol 2002, V155, P463
- (207) Schwerdt, P; Proc Soc Exp Biol Med 1975, V148, P1237
CAPLUS
- (208) Seib, P; Ascorbic Acid:Chemistry Metabolism, and Uses
Advances in Chemistry Series 200 1982, P1
- (209) Seitz, G; Neurosci Lett 1998, V244, P33 CAPLUS
- (210) Sharma, P; J Leukoc Biol 2004, V75, P1070 CAPLUS
- (211) Shiga, M; J Bone Miner Res 2003, V18, P67 CAPLUS
- (212) Shin, D; Neuroreport 2004, V15, P1959 CAPLUS
- (213) Simon, J; Am J Epidemiol 2001, V154, P427 MEDLINE
- (214) Simon, J; Arch Intern Med 1999, V159, P619 MEDLINE
- (215) Simon, J; J Am Coll Nutr 2001, V20, P255 CAPLUS

- (216) Simon, J; J Am Coll Nutr 2003, V22, P283
- (217) Smith, J; J Parenter Enteral Nutr 1988, V12, P478
CAPLUS
- (218) Sotiriou, S; Nat Med 2002, V8, P514 CAPLUS
- (219) Soto-Otero, R; J Neurochem 2000, V74, P1605 CAPLUS
- (220) Stadtman, E; Am J Clin Nutr 1991, V54, P125S
- (221) Standing Committee On The Scientific Evaluation Of
Dietary Reference Intakes; Dietary Reference
Intakes for Vitamin C, Vitamin E, Selenium, and
Beta Carotene, and Other Carotenoids 2000
- (222) Steinberg, F; Am J Clin Nutr 1998, V68, P319 CAPLUS
- (223) Szent-Gyorgyi, A; Biochem J 1928, V22, P1387 CAPLUS
- (224) Takanaga, H; Pflugers Arch 2004, V447, P677 CAPLUS
- (225) Tangney, C; Prog Clin Biol Res 1988, V259, P331 CAPLUS
- (226) Tauler, P; Free Radic Res 2003, V37, P931 CAPLUS
- (227) Taylor, E; J Am Soc Nephrol 2004, V15, P3225
- (228) Terada, M; Anal Biochem 1978, V84, P604 CAPLUS
- (229) Thomson, C; Food Chem 1995, V53, P43
- (230) Tinker, D; Physiol Rev 1985, V65, P607 CAPLUS
- (231) Traxer, O; J Urol 2003, V170, P397 CAPLUS
- (232) Tsao, C; J Chromatogr 1985, V13, P855 CAPLUS
- (233) Uchida, K; Biochim Biophys Acta 1989, V991, P377
CAPLUS
- (234) Urso, M; Toxicology 2003, V189, P41 CAPLUS
- (235) Valero, M; J Nutr 2002, V132, P1299 CAPLUS
- (236) Vanzoeren-Grobbe, D; Am J Clin Nutr 1994, V60, P900
MEDLINE
- (237) Wang, S; Eur J Clin Pharmacol 1999, V55, P527 CAPLUS
- (238) Waugh, W; J Biol Chem 1932, V97, P325 CAPLUS
- (239) Weber, P; Int J Vitam Nutr Res 1999, V69, P194 CAPLUS
- (240) Weening, R; Blood 1980, V57, P856
- (241) Wess, T; Adv Protein Chem 2005, V70, P341 CAPLUS
- (242) Wilson, J; Annu Rev Nutr 2005, V25, P105 CAPLUS
- (243) Wilson, J; Annu Rev Nutr 2005, V25, P105 CAPLUS
- (244) Yokoyama, T; Stroke 2000, V31, P2287 CAPLUS
- (245) Zhang, H; Cancer 1997, V80, P1897 CAPLUS
- (246) Zilva, S; Biochem J 1932, V26, P1624 CAPLUS

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ABSTRACT:

A review. Originally developed in the late 1960s, anodic bonding, also known as electrostatic bonding, field-assisted bonding or Mallory bonding, has become one of the most important silicon packaging techniques. Despite its industrial relevance the bonding mechanism is mainly only qual. understood and is almost solely applied to the bonding of silicon to Pyrex glass. The objective of the present paper is to review the current state of knowledge of the anodic bonding process. Possible material combinations and current scientific and industrial applications of this bonding technique are reviewed. The various aspects of the bonding process, such as the creation of intimate contact, the cation movement in the glass and the interfacial chemical reactions, are discussed in

detail and related to the external current measured during bonding to describe the bonding process quant. A better understanding of the process itself should help not only to improve the process control and the quality of devices, but also to broaden the application of this successful bonding technique to more challenging designs, to smaller device sizes and to systems other than silicon-Pyrex glass.

SUPPL. TERM: review anodic bonding silicon glass packaging

INDEX TERM: Diffusion
Electric current
Electronic packaging process
Glass substrates
Interfacial reaction
Joining

(anodic bonding)

INDEX TERM: 7440-21-3, Silicon, processes

ROLE: PEP (Physical, engineering or chemical process); TEM
(Technical or engineered material use); PROC (Process); USES
(Uses)

(anodic bonding)

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REFERENCE(S): (1) Albaugh, K; J Am Ceram Soc 1992, V75, P2644 CAPLUS
(2) Albaugh, K; J Electrochem Soc 1991, V138, P3089 CAPLUS
(3) Albaugh, K; Mater Lett 1986, V4, P465
(4) Allen, H; M R S Proc, Paper 174 2001, V681E
(5) Alley, T; J Appl Phys 1999, V86, P6634 CAPLUS
(6) Alley, T; J Non-Cryst Solids 1998, V242, P165 CAPLUS
(7) Anderson, O; J Am Ceram Soc 1954, V37, P573 CAPLUS
(8) Anthony, T; J Appl Phys 1983, V54, P2419 CAPLUS
(9) Anthony, T; J Appl Phys 1985, V58, P1240 CAPLUS
(10) Arata, Y; Trans JWRI 1984, V13, P35 CAPLUS
(11) Arata, Y; Trans JWRI 1986, V15, P387 CAPLUS
(12) Baier, V; Electrochem Soc Proc 1997, V97-36, P222
(13) Baine, P; Electrochem Soc Proc 1997, V97-36, P214
(14) Baine, P; Thin Solid Films 1997, V296, P141 CAPLUS
(15) Bansal, N; Handbook of glass properties 1986
(16) Barnes, D; US 6072580 2000
(17) Baumann, H; Electrochem Soc Proc 1995, V95-7, P471
CAPLUS
(18) Beaumont, J; J Phys Chem Solids 1967, V28, P657 CAPLUS
(19) Berthold, A; Sensors Actuators A 2000, V82, P224
(20) Birks, N; Introduction to high temperature oxidation of
metals 1983
(21) Bishop, D; M R S Bull 2001, P282
(22) Blasquez, G; Sensors Actuators A 2000, V85, P65
(23) Bleaney, B; 'Electricity and magnetism', 2nd edn 1965,
P26
(24) Blom, M; J Micromech Microeng 2001, V11, P382 CAPLUS
(25) Bongiorno, A; Phys Rev B 2004, V70 CAPLUS
(26) Borom, M; J Am Ceram Soc 1973, V56, P254 CAPLUS
(27) Briand, D; J Micromech Microeng 2005, V15, P1657 CAPLUS
(28) Briand, D; Sensors Actuators A 2004, V114, P543
(29) Brooks, A; J Electrochem Soc 1972, V119, P545 CAPLUS
(30) Brownlow, J; 1978, RC 7101
(31) Bruschi, P; IEEE Trans Aero Elec Syst 2002, V38, P982
(32) Bycon, S; Mater Sci Eng A 2000, V287, P159
(33) Carl, D; J Appl Phys 1991, V70, P3301 CAPLUS
(34) Carlson, D; J Am Ceram Soc 1972, V55, P337 CAPLUS
(35) Carlson, D; J Am Ceram Soc 1974, V57, P291 CAPLUS
(36) Carlson, D; J Am Ceram Soc 1974, V57, P295 CAPLUS
(37) Carlson, D; J Am Ceram Soc 1974, V57, P461 CAPLUS
(38) Chason, M; US 4639631 1987

- (39) Chen, H; Appl Catal A 2005, V286, P186 CAPLUS
- (40) Choi, S; J Electrochem Soc 2002, V149, PG8 CAPLUS
- (41) Choi, W; J Electrochem Soc 1999, V146, P400 CAPLUS
- (42) Choi, W; J Mater Sci 1999, V34, P4711 CAPLUS
- (43) Choi, W; J Micromech Microeng 1997, V7, P316 CAPLUS
- (44) Christian, J; The Theory of Transformations in Metals and Alloys', 2nd edn, Part 1 1975
- (45) Chung, G; Sensors Mater 2005, V17, P39 CAPLUS
- (46) Collart, E; J Synchrotron Radiat 2005, V12, P473 CAPLUS
- (47) Cozma, A; J Micromech Microeng 1995, V5, P98 CAPLUS
- (48) Cozma, A; J Micromech Microeng 1998, V8, P69 CAPLUS
- (49) Dehennis, A; J Micromech Syst 2005, V14, P12
- (50) Delrio, F; Nature Mater 2005, V4, P629 CAPLUS
- (51) Dennee, P; J Appl Phys 1969, V40, P5396 CAPLUS
- (52) Despont, M; Sensors Actuators A 1996, V55, P219
- (53) Doi, A; J Appl Phys 1990, V67, P691 CAPLUS
- (54) Doi, A; J Mater Sci 1986, V21, P1863 CAPLUS
- (55) Doi, A; J Mater Sci 1987, V22, P761 CAPLUS
- (56) Donald, I; J Mater Sci 1993, V28, P2841 CAPLUS
- (57) Doran, J; The Times 2005, V29(68297), P62
- (58) Doremus, R; 'Glass science', 2nd edn 1994
- (59) Doweidar, H; J Phys Chem Solids 1992, V53, P807 CAPLUS
- (60) Duffin, W; Electricity and magnetism 1965, P348
- (61) Dunn, B; US 4142946 1979 CAPLUS
- (62) Dunn, B; J Am Ceram Soc 1979, V62, P545 CAPLUS
- (63) Dunn, M; Acta Mater 2000, V48, P735 CAPLUS
- (64) Dziuban, J; Proc 13th Eur Conf on 'Solid-state transducers' (Euroensors XIII) 1999, P387
- (65) Elliott, S; Physics of amorphous materials 1983
- (66) Erill, I; J Micromech Microeng 2004, V14, P1558
- (67) Esashi, M; Electrochem Soc Proc 1993, V93-29, P348 CAPLUS
- (68) Esashi, M; Sensors Actuators A 1990, V21-23, P931
- (69) Ewalds, H; Fracture mechanics 1984, P36
- (70) Fonslow, B; Anal Chem 2005, V77, P5706 CAPLUS
- (71) Fritzsche, B; Proc 5th Int Conf on 'Joining - ceramics, glass and metal' 1997
- (72) Frye, R; J Electrochem Soc 1986, V133, P1673 CAPLUS
- (73) Gerlach, G; TM - Tech Mess 2005, V72, P53
- (74) Gorecka-Drzazga, A; J Micromech Microeng 2004, V14, P907 CAPLUS
- (75) Gossink, R; J Am Ceram Soc 1978, V61, P539 CAPLUS
- (76) Greenwood, J; Proc Roy Soc Lond A 1966, V295, P300 CAPLUS
- (77) Groza, J; J Mater Res 2001, V16, P286 CAPLUS
- (78) Han, J; Science 2000, V288, P1026 CAPLUS
- (79) Hanneborg, A; J Micromech Microeng 1992, V2, P117 CAPLUS
- (80) Harz, M; Electrochem Soc Proc 1995, V95-7, P315 CAPLUS
- (81) Harz, M; J Micromech Microeng 1992, V2, P161 CAPLUS
- (82) Harz, M; Sensors Actuators A 1996, V55, P201
- (83) Haven, Y; Phys Chem Glasses 1965, V6, P38 CAPLUS
- (84) Hench, L; 'Principles of electronic ceramics' 1990, P223
- (85) Henning, A; Proc SPIE Symp on 'Micromachined devices and components' 1998, V3514, P159 CAPLUS
- (86) Higa, K; Jpn J Appl Phys 2002, V41, P4307 CAPLUS
- (87) Hiratsuka, A; Electroanalysis 1998, V10, P231 CAPLUS
- (88) Hofmann, J; US 5980349 1999 CAPLUS
- (89) Hofmann, J; US 6734619 2004 CAPLUS
- (90) Hok, B; Appl Phys Lett 1983, V43, P267
- (91) Hsieh, G; Microelectron J 2005, V36, P678 CAPLUS
- (92) Hurd, D; J Mater Res 1995, V10, P387 CAPLUS

- (93) Hutchings, I; Tribology:friction and wear of engineering materials 1992
- (94) Ikeuchi, K; Proc 5th Int Conf on `Joining - ceramics, glass and metal' 1997, V184, P88 CAPLUS
- (95) Ingram, M; Phys Chem Glasses 1987, V28, P215 CAPLUS
- (96) Jorgensen, P; J Chem Phys 1962, V37, P874 CAPLUS
- (97) Kanda, Y; Sensors Actuators A 1990, V21-23, P939
- (98) Kang, P; J Micromech Microeng 2005, V15, P1076
- (99) Karnezos, M; US 4632871 1986 CAPLUS
- (100) Kim, C; J Am Ceram Soc 1976, V59, P127 CAPLUS
- (101) Kim, M; Sensors Actuators B 2005, V107, P818
- (102) Kingery, W; `Introduction to ceramics', 2nd edn 1976, P935
- (103) Kitching, J; Metrologia 2005, V42, PS100 CAPLUS
- (104) Knappe, S; Opt Express 2005, V13, P1249 CAPLUS
- (105) Kricka, L; Clin Chem 1993, V39, P1944 MEDLINE
- (106) Krieger, U; J Non-Cryst Solids 1988, V102, P50 CAPLUS
- (107) Kutchoukov, V; Sensors Actuators A 2004, V114, P521
- (108) Kutchoukov, V; Sensors Actuators A 2005, V123-124, P602
- (109) Lange, K; Electrochem Soc Proc 1995, V95-7, P371 CAPLUS
- (110) Lee, D; J Micromech Microeng 1999, V9, P313 CAPLUS
- (111) Lee, D; J Vac Sci Technol B 2001, V19, P1381 CAPLUS
- (112) Lee, D; Sensors Actuators A 2001, V89, P43
- (113) Lee, D; Sensors Actuators B 2004, V103, P409
- (114) Lee, K; J Vac Sci Technol B 1994, V12, P3425 CAPLUS
- (115) Lee, R; IEEE Proc - Sci Meas Technol 2001, V148, P8 CAPLUS
- (116) Lee, T; J Microelectromech Syst 2000, V9, P469 CAPLUS
- (117) Lee, T; Sensors Actuators A 2000, V86, P103
- (118) Lee, W; Appl Phys Lett 1987, V50, P522 CAPLUS
- (119) Lepienski, C; J Non-Cryst Solids 1993, V159, P204 CAPLUS
- (120) Li, H; J Micromech Syst 2005, V14, P103
- (121) Lide, D; `CRC handbook of chemistry and physics', 74th edn 1993, P10-205
- (122) Lin, Y; Anal Chem 2003, V75, P5381 CAPLUS
- (123) Lindner, P; Solid State Technol 2004, V47(6), P55 CAPLUS
- (124) Llewellyn-Jones, F; Ionization and breakdown in gases 1957
- (125) Macdonald, J; J Appl Phys 1973, V44, P3455 CAPLUS
- (126) Macdonald, J; J Chem Phys 1973, V58, P4982 CAPLUS
- (127) Mack, S; J Electrochem Soc 1997, V144, P1106 CAPLUS
- (128) Makino, E; Sensors Actuators A 2000, V79, P251
- (129) Mao, P; Lab Chip 2005, V5, P837 CAPLUS
- (130) Martin, S; J Am Ceram Soc 1991, V74, P1767 CAPLUS
- (131) Mayer, J; Electronic materials science for integrated circuits in Si and GaAs 1990, P251
- (132) McKibben, G; Cutting edge:Gillette's journey to global leadership 1998, P281
- (133) Mikkor, M; US 4773972 1988
- (134) Minegishi, T; J Mater Sci 1991, V26, P5473 CAPLUS
- (135) Mirza, A; Sensors 1998, P24
- (136) Mitoff, S; J Appl Phys 1972, V43, P927 CAPLUS
- (137) Mitoff, S; J Appl Phys 1973, V44, P3786 CAPLUS
- (138) Miyazaki, S; US 6537938 2003 CAPLUS
- (139) Moore, J; Chemical metallurgy V87, P1981
- (140) Morsy, M; Mater Trans JIM 1996, V37, P1511 CAPLUS
- (141) Morsy, M; Proc 5th Int Conf on `Trends in welding research' 1998, P251

- (142) Moulson, A; ` Electroceramics:materials, properties, applications', 2nd edn 2003, P185
- (143) Moynihan, C; J Am Ceram Soc 1993, V76, P1081 CAPLUS
- (144) Mukherjee, E; Sensors Actuators A 2004, V114, P267
- (145) Myers, D; US 4384899 1983 CAPLUS
- (146) Nese, M; Sensors Actuators A 1993, V37-38, P61 CAPLUS
- (147) Nicholas, M; J Mater Sci 1982, V17, P3347 CAPLUS
- (148) Niedermann, P; Surf Interf Anal 1999, V27, P296 CAPLUS
- (149) Nitzsche, P; J Electrochem Soc 1998, V145, P1755
CAPLUS
- (150) Nogi, K; ISIJ Int 1990, V30, P1092 CAPLUS
- (151) Obermeier, E; Electrochem Soc Proc 1995, V95-7, P212
CAPLUS
- (152) Ohmori, A; Thin Solid Films 1992, V207, P153 CAPLUS
- (153) Paschen, F; Annalen der Physik und Chemie 1889, V37, P69
- (154) Peeters, E; J Micromech Microeng 1992, V2, P167 CAPLUS
- (155) Plaza, J; Electrochem Solid-State Lett 2000, V3, P392
CAPLUS
- (156) Plaza, J; IEEE Sensors J 2004, V4, P195 CAPLUS
- (157) Plaza, J; J Electrochem Soc 1997, V144, PL108 CAPLUS
- (158) Plaza, J; J Microelectromech Syst 2002, V11, P794
CAPLUS
- (159) Plaza, J; Sensors Actuators A 1997, V60, P176
- (160) Plaza, J; Sensors Actuators A 1998, V67, P181
- (161) Plol, A; Mater Sci Eng Rep 1999, V25, P1
- (162) Pomerantz, D; US 3397278 1968
- (163) Pomerantz, D; US 3417459 1968
- (164) Rahali, F; Hybrid Circ 1994, 35, P18
- (165) Rawson, H; Glasses and their applications 1991
- (166) Raymond, D; Anal Chem 1996, V68, P2515 CAPLUS
- (167) Rios, A; Rev Bras Aplic Vacuo 2000, V19, P31 CAPLUS
- (168) Rogers, T; Adv Electron Manuf Technol 2004, V-EMT 1, P13
- (169) Rogers, T; J Micromech Microeng 1992, V2, P164 CAPLUS
- (170) Rogers, T; Sensors Actuators A 1995, V46-47, P113
- (171) Rogers, T; Sensors Actuators A 2005, V123-124, P106
- (172) Ruano, J; Anal Chem 2000, V72, P1093 CAPLUS
- (173) Russell, A; Proc Phys Soc Lond 1906, V20, P49
- (174) Sassen, S; Sensors Actuators A 2000, V83, P150
- (175) Schjolberg-Henriksen, K; J Micromech Microeng 2003, V13, P845 CAPLUS
- (176) Schjolberg-Henriksen, K; Sensors Actuators A 2004, V114, P332
- (177) Schmidt, B; Sensors Actuators A 1998, V67, P191
- (178) Schmidt, M; Proc IEEE 1998, V86, P1575 CAPLUS
- (179) Schutt, H; J Non-Cryst Solids 1992, V144, P1
- (180) Shih, W; J Appl Phys 2004, V95, P2800 CAPLUS
- (181) Shimp, A; ISIJ Int 1990, V30, P1101 CAPLUS
- (182) Sim, D; J Micromech Microeng 1996, V6, P266 CAPLUS
- (183) Slade, P; IEEE Trans Compon Pack Technol 2002, V25, P390
- (184) Sooriakumar, K; Electrochem Soc Proc 1993, V93-29, P225 CAPLUS
- (185) Spangler, G; J Micromech Microeng 2002, V12, P541
CAPLUS
- (186) Suganuma, K; Mater Sci Technol 1986, V2, P1156 CAPLUS
- (187) Sutton, P; J Am Ceram Soc 1964, V47, P188 CAPLUS
- (188) Sutton, P; J Am Ceram Soc 1964, V47, P219
- (189) Szymanski, M; Solid-State Electron 2001, V45, P1233
CAPLUS
- (190) Takahashi, M; Solid State Ionics 2004, V172, P335
CAPLUS

- (191) Teh, W; Appl Phys Lett 2005, V87
- (192) Tiggelaar, R; Lab Chip 2005, V5, P326 CAPLUS
- (193) Tiggelaar, R; Sensors Actuators A 2005, V119, P196
- (194) Tong, Q; Semiconductor wafer bonding:science and technology 1999
- (195) Torres, J; Nanotechnology 1999, V10, P102
- (196) Toyoda, M; IIW Doc I-955-92 1992
- (197) Travessa, D; Mater Sci Eng A 2002, V337, P287
- (198) Travessa, D; Mater Sci Technol 2000, V16, P687 CAPLUS
- (199) Tudryn, C; J Electrochem Soc 2005, V152, PE131 CAPLUS
- (200) van Elp, J; J Vac Sci Technol B 2005, V23, P96 CAPLUS
- (201) van Helvoort, A; J Am Ceram Soc 2003, V86, P1773 CAPLUS
- (202) van Helvoort, A; J Electrochem Soc 2003, V150, PG624 CAPLUS
- (203) van Helvoort, A; Key Eng Mater 2004, V264-268, P649 CAPLUS
- (204) van Helvoort, A; PhD thesis, University of Cambridge 2002
- (205) van Helvoort, A; Philos Mag 2004, V84, P505 CAPLUS
- (206) Veenstra, T; J Electrochem Soc 2001, V148, PG68 CAPLUS
- (207) Visser, M; J Micromech Microeng 2001, V11, PN1 CAPLUS
- (208) Visser, M; Sensors Actuators A 2001, V92, P223
- (209) Von Hippel, A; Phys Rev 1953, V91, P568 CAPLUS
- (210) Wallis, G; Ceram Bull 1971, V50, P958 CAPLUS
- (211) Wallis, G; Electrocomp Sci Technol 1975, V2, P45 CAPLUS
- (212) Wallis, G; J Am Ceram Soc 1970, V53, P563 CAPLUS
- (213) Wallis, G; J Appl Phys 1969, V40, P3946 CAPLUS
- (214) Wang, J; Electrochim Acta 1993, V38, P2111 CAPLUS
- (215) Watson, C; Master's dissertation, New Mexico, Institute of Mining and Technology 2001
- (216) Wei, J; J Micromech Microeng 2003, V13, P217 CAPLUS
- (217) Wei, J; Sensors Actuators A 2004, V113, P218
- (218) Wei, J; Thin Solid Films 2004, V462-463, P487 CAPLUS
- (219) Weichel, S; Proc 13th Eur Conf on `Solid-state transducers' (Euroensors XIII) 1999, P813
- (220) Weichel, S; Sensors Actuators A 2000, V82, P249
- (221) Wilding, P; Clin Chem 1994, V40, P43 MEDLINE
- (222) Williamson, J; Proc Roy Soc Lond A 1956, V237, P560
- (223) Xing, Q; J Mater Sci:Mater Electron 2002, V13, P83 CAPLUS
- (224) Xing, Q; Scr Mater 2002, V47, P577 CAPLUS
- (225) Younger, P; J Non-Cryst Solids 1980, V38-39, P909 CAPLUS
- (226) Zachariasen, W; J Am Chem Soc 1932, V54, P3841 CAPLUS
- (227) Zhang, Y; Biosensor Bioelectron 2004, V19, P1733 CAPLUS

L22 ANSWER 4 OF 9 CAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 2004:142631 CAPLUS

DOCUMENT NUMBER: 140:159044

ENTRY DATE: Entered STN: 22 Feb 2004

TITLE: Mold-resistant corrugated cardboard for void-forming structures

INVENTOR(S): Comeau, Dominic Hamel; Rosenblat, Michael L.

PATENT ASSIGNEE(S): Voidform International Ltd., Can.

SOURCE: U.S. Pat. Appl. Publ., 8 pp.
CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

INT. PATENT CLASSIF.:

MAIN: B32B001-00
 US PATENT CLASSIF.: 428178000
 CLASSIFICATION: 5-2 (Agrochemical Bioregulators)
 Section cross-reference(s): 43
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 20040033343	A1	20040219	US 2003-459287	20030611
US 6794017	B2	20040921		
CA 2431614	A1	20031212	CA 2003-2431614	20030610
PRIORITY APPLN. INFO.:			US 2002-388134P	P 20020612

PATENT CLASSIFICATION CODES:

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 20040033343	ICM	B32B001-00
	INCL	428178000
	IPCI	B32B0001-00 [ICM, 7]
	IPCR	B32B0001-00 [I,C*]; B32B0001-00 [I,A]; B32B0003-28 [I,C*]; B32B0003-28 [I,A]; D21H0011-00 [I,C*]; D21H0011-00 [I,A]; E02D0031-00 [I,C*]; E02D0031-10 [I,A]; E04B0005-32 [I,C*]; E04B0005-32 [I,A]; E04C0003-30 [I,C*]; E04C0003-34 [I,A]; E04G0015-00 [I,C*]; E04G0015-06 [I,A]; B31F0001-20 [I,C*]; B31F0001-28 [I,A]; B32B0027-08 [I,C*]; B32B0027-08 [I,A]; D21H0017-00 [N,C*]; D21H0017-28 [N,A]; D21H0021-14 [N,C*]; D21H0021-36 [N,A]; D21H0027-30 [I,C*]; D21H0027-40 [I,A]
	NCL	428/178.000; 428/182.000; 156/292.000; 162/161.000
	ECLA	B32B027/08; B31F001/28B1; D21H027/40; E02D031/10; E04B005/32; E04C003/34; E04G015/06B; N21H; N21H
CA 2431614	IPCI	D21H0021-36 [ICM, 7]; D21H0021-14 [ICM, 7, C*]; D21F0011-12 [ICS, 7]; D21F0011-00 [ICS, 7, C*]; B31F0001-20 [ICS, 7]
	IPCR	B31F0001-20 [I,C*]; B31F0001-20 [I,A]; D21F0011-00 [I,C*]; D21F0011-12 [I,A]; D21H0021-14 [I,C*]; D21H0021-36 [I,A]

ABSTRACT:

Corrugated cardboard that resists the growth of mold includes single and double face liners produced with pulp and starch, where the latter is diluted with water to which biocides have been added. The liner biocides include 5-chloro-2-methyl-4-isothiazolin-3-one, hypochlorite and sodium hydroxide and sodium bromide. A fluted medium is sandwiched between the single and double face liners with an adhesive that is produced with diluted starch and to which biocides have also been added. The biocides in the adhesive include 1,2-benzothiazol-3(2H)-one and poly[oxyethylene(dimethyliminio)ethylene dichloride].

SUPPL. TERM: mold corrugated cardboard fungicide
 INDEX TERM: Paperboard
 (corrugated; mold-resistant corrugated cardboard for void-forming structures)
 INDEX TERM: Biocides
 (in mold-resistant corrugated cardboard for void-forming structures)
 INDEX TERM: Fungicides
 Mold (fungus)
 (mold-resistant corrugated cardboard for void-forming structures)
 INDEX TERM: 2634-33-5, 1,2-Benzisothiazol-3(2H)-one 7647-15-6, Sodium bromide., biological studies 14380-61-1, Hypochlorite 26172-55-4, 5-Chloro-2-methyl-4-isothiazolin-3-one

31512-74-0

ROLE: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(in mold-resistant corrugated cardboard for void-forming structures)

REFERENCE COUNT: 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD.

REFERENCE(S): (1) Kell; US 3109217 A 1963
(2) MacDonald; US 1892311 A 1932
(3) Oliver; US 3358960 A 1967
(4) Raney; US 2881501 A 1959
(5) Rosenblat; US 6050043 A 2000
(6) Rosenblat; US 6116568 A 2000 CAPLUS
(7) Shuxteau; US 3024513 A 1962
(8) Skuratowicz; US 6228158 B1 2001 CAPLUS
(9) Stark; US 3512747 A 1970
(10) Weisgerber; US 3085026 A 1963 CAPLUS

L22 ANSWER 5 OF 9 CAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 2002:550899 CAPLUS

DOCUMENT NUMBER: 137:89509

ENTRY DATE: Entered STN: 25 Jul 2002

TITLE: Saturated halogenated aliphatic hydrocarbons: two to four carbons

AUTHOR(S): Reid, Jon B.

CORPORATE SOURCE: University of Cincinnati, Cincinnati, OH, USA

SOURCE: Patty's Toxicology (5th Edition) (2001), Volume 5, 99-204. Editor(s): Bingham, Eula; Cohrssen, Barbara; Powell, Charles H. John Wiley & Sons, Inc.: New York, N. Y.

CODEN: 69CWST; ISBN: 0-471-31943-0

DOCUMENT TYPE: Conference; General Review

LANGUAGE: English

CLASSIFICATION: 4-0 (Toxicology)

ABSTRACT:

A review. Properties and toxicol. of saturated halogenated aliphatic hydrocarbons with two to four carbons are comprehensively surveyed.

SUPPL. TERM: review toxicol halogenated hydrocarbon

INDEX TERM: Hydrocarbons, biological studies

ROLE: BSU (Biological study, unclassified); BIOL (Biological study)

(halo, C2-4; properties and toxicol. of saturated halogenated aliphatic hydrocarbons with two to four carbons)

REFERENCE COUNT: 398 THERE ARE 398 CITED REFERENCES AVAILABLE FOR THIS RECORD.

REFERENCE(S): (1) Abreu, B; J Pharmacol Exp Ther 1944, V80, P139 CAPLUS
(2) Adams, E; Arch Ind Hyg Occup Med 1950, V1, P225 CAPLUS
(3) Agency for Toxic Substances and Disease Registry; Draft Toxicological Profile for 1,1-Dichloroethane 1990
(4) Agency for Toxic Substances and Disease Registry; Toxicological Profile for 1,1,2,2-Tetrachloroethane 1989, ATSDR/TP 89-22
(5) Agency for Toxic Substances and Disease Registry; Toxicological Profile for Chloroethane 1998
(6) Agency for Toxic Substances and Disease Registry; Toxicological Profile for Hexachloroethane 1998
(7) Agency for Toxic Substances and Disease Registry; Toxicology Profile for 1,1,1-Trichloroethane PB91-180463
(8) Agency for Toxic Substances and Disease Registry; Toxicology Profile for 1,1,1-Trichloroethane 1990, TP-90-27

- (9) Agency for Toxic Substances and Disease Registry;
Toxicology Profile for 1,2-Dichloroethane 1989
- (10) Agency for Toxic Substances and Disease Registry;
<http://atsdr1.atsdr.cdc.gov/toxpro2.html>
- (11) Aldrich Chemical Company; Aldrich Catalog/Handbook of
Fine Chemicals 13,527-5
- (12) Aldrich Chemical Company; Aldrich Catalog/Handbook of
Fine Chemicals 1988, 18, 557-4, P1381
- (13) Alexeeff, G; Rev Environ Contam Toxicol 1990, V112, P49
CAPLUS
- (14) Algmot, E; Fundam Cosmet Toxicol 1972, V14, P105
- (15) Aman, J; Ann Appl Biol 1946, V33, P389 CAPLUS
- (16) Amooore, J; J Appl Toxicol 1983, V3, P272 CAPLUS
- (17) Anon; American Conference of Governmental Industrial
Hygienists 1986
- (18) Anon; American Conference of Governmental Industrial
Hygienists 1986, P9
- (19) Anon; American Conference of Governmental Industrial
Hygienists 1999
- (20) Anon; Dangerous Properties of Industrial Materials
Report 1986, V6(4), P70
- (21) Anon; Directory of Chemical Producers 1985
- (22) Anon; Ethylene Dichloride: A Potential Health Risk
1980, P3
- (23) Anon; Fed Regist P35340
- (24) Anon; Fed Regist 1989, V54(12), P2487
- (25) Anon; Fed Regist 1989, V54(12), P2937
- (26) Anon; Fed Regist 1993, V58, P35308
- (27) Anon; Fed Regist 1993, V58(124), P35338
- (28) Anon; Fed Regist 1993, V58, P40191
- (29) Anon; Fed Regist 1993, V58, P40191
- (30) Anon; Journal of Commerce 1986
- (31) Anon; Material Safety Data Sheets Service 5846-103,
D-03
- (32) Anon; Material Safety Data Sheets Service 1989,
2654-017, A-05
- (33) Anon; Progress in Genetic Toxicology 1977, P245
- (34) Anon; The Merck Index 10th ed 1983, P550
- (35) Anon; <http://ntp-server.niehs.nih.gov>
- (36) Anon; <http://www.epa.gov/iris>
- (37) Arkhangel-Skaya, I; Abstr Ind Hyg Dig 1957, V21, P16
- (38) Arkhangel-Skaya, I; Mater Vopr Gig Tr Klin Prof Bolezn
Sb 1965, V5, P190
- (39) Astrand, I; Work Environ Health 1973, V9, P69
- (40) Baganz, H; Arzneim-Forsch 1961, V11, P902 CAPLUS
- (41) Balazs, T; Casarett and Doull's Toxicology: The Basic
Science of Poisons 3rd ed 1986, P390
- (42) Barber, E; Mutat Res 1981, V90, P31 CAPLUS
- (43) Barsoum, G; QJ Pharm Pharmacol 1934, V7, P205
- (44) Bass, M; J Am Med Assoc 1970, V212, P2075 MEDLINE
- (45) Blumgart, H; J Clin Invest 1931, V9, P635 CAPLUS
- (46) Bogen, K; Regul Toxicol Pharmacol 1989, V10, P26 CAPLUS
- (47) Boman, J; Dev Toxicol Environ Sci 1986, V12, P175
- (48) Bonventre, J; J Anal Toxicol 1977, V1, P158
- (49) Bransley, E; Biochem J 1966, V100, P362
- (50) Brem, H; Cancer Res 1974, V34, P2576 CAPLUS
- (51) Breslin, W; Ethyl Chloride (E+Cl): Effects on Estrous
Cycling in B6C3F1 Mice 1988
- (52) Bronzetti, G; Teratog, Carcinog, Mutagen 1989, V9, P349
CAPLUS
- (53) Bruckner, J; Fundam Appl Toxicol 1989, V12, P713 CAPLUS
- (54) Bruckner, J; Toxicologist 1985, V5
- (55) Calingaert, G; Ind Eng Chem 1948, V40, P332 CAPLUS

- (56) Caplan, Y; Clin Toxicol 1976, V9, P69 MEDLINE
- (57) Carpenter, C; J Ind Hyg Toxicol 1949, V31, P343 CAPLUS
- (58) Chieruttini, M; CAPLUS
- (59) Chieruttini, M; Br J Pharmacol 1976, V57, P421
- (60) Cohn, C; Dsch Monatsschr Zahnhehygi 1891, V9, P107
- (61) Cox, P; Xenobiotica 1976, V6, P363 CAPLUS
- (62) Coyer, H; Ind Med 1944, V13, P320
- (63) Crummett, W; Ind Eng Chem 1956, V48, P434 CAPLUS
- (64) Dapson, S; Teratology 1984, V29, P25A
- (65) Davidson, B; J Pharmacol Exp Ther 1926, V26, P37
- (66) Davidson, I; Drug Chem Toxicol 1982, V5, P319 CAPLUS
- (67) Davidson, K; Final Report 1988, ORNL-6469
- (68) Deguchi, T; Osaka City Med J 1972, V21, P187 CAPLUS
- (69) DiVincenzo, G; Am Ind Hyg Assoc J 1974, V35, P21 CAPLUS
- (70) Dipple, A; Carcinogenesis 1981, V2, P103 CAPLUS
- (71) Dobkin, A; Textbook of Veterinary Anesthesia 1971, P94
CAPLUS
- (72) Dornette, W; Anesth Analg 1966, V39, P249
- (73) Dreser, H; Arch Exp Pathol Pharmako 1895, V36, P285
- (74) du Pont deNemours, E; Cardiac Sensitization Testing in
Dogs with Ethyl Chloride 1971
- (75) D'Sousa, R; J Pharmacol Exp Ther 1988, V245, P563
- (76) Eben, A; Arch Toxikol 1974, V31, P233 CAPLUS
- (77) Epstein, S; Toxicol Appl Pharmacol 1972, V23, P288
CAPLUS
- (78) Farber, H; Chief of Air Quality Data Analysis 1977
- (79) Fishbein, L; Sci Total Environ 1979, V11, P163 CAPLUS
- (80) Fitzpatrick, W; Q Bull Northwestern Univ Med Soc 1952,
V26, P313 CAPLUS
- (81) Flury, F; Schaedliche Gase 1931
- (82) Fowler, J; Br J Pharmacol 1969, V35, P530 CAPLUS
- (83) Fowler, J; J Comp Pathol 1970, V80, P465 CAPLUS
- (84) Fukabori, S; CAPLUS
- (85) Fukabori, S; J Sci Lab 1976, V52, P67 CAPLUS
- (86) Fukabori, S; Rodo Kagaku 1977, V53, P89 CAPLUS
- (87) Gage, J; Br J Ind Med 1970, V27, P1 CAPLUS
- (88) Gamberale, F; Work, Environ, Health 1973, V10, P82
CAPLUS
- (89) Gehring, P; Handbook of Pesticide Technology 1991, V2
- (90) Gehring, P; Toxicol Appl Pharmacol 1968, V13, P287
CAPLUS
- (91) Geller, I; J Toxicol Environ Health 1982, V9, P783
CAPLUS
- (92) George, J; Fundam Appl Toxicol 1989, V13, P641 CAPLUS
- (93) Ghittori, S; Am Ind Hyg Assoc J 1987, V48, P786 CAPLUS
- (94) Glasser, E; Arch Hyg 1929, V101, P48
- (95) Gobbato, F; Securitas 1968, V53, P43
- (96) Gohlke, R; Z Gesamte Hyg Ihre Grenzeb 1977, V20, P278
- (97) Goldworthy, T; Toxicol Appl Pharmacol 1988, V96, P367
- (98) Gorzinski, S; Drug Chem Toxicol 1985, V8(3), P155
CAPLUS
- (99) Gosselin, R; Clinical Toxicology of Commercial Products
5th ed 1984, 372, PII-164
- (100) Grant, W; Toxicology of the Eye 2nd ed 1978, P234
- (101) Gray, M; Arch Ind Hyg Occup Med 1950, V2, P407 CAPLUS
- (102) Grimm, V; Vierteljahresschr Gerichtl Med Oeff
Sanitaetswes 1914, V48, P161
- (103) Grzywa, Z; Contact Dermatitis 1981, V7, P151 CAPLUS
- (104) Guengerich, F; Toxicol Appl Pharmacol 1980, V55, P303
CAPLUS
- (105) Gurney, R; Gastroenterology 1943, V1, P1112 CAPLUS
- (106) Haid, B; Curr Res Anesth 1954, V33, P318 CAPLUS
- (107) Hake, C; Arch Environ Health 1960, V1, P101 CAPLUS

- (108) Halevy, J; Clin Toxicol 1980, V16, P467 MEDLINE
- (109) Hall, F; J Forensic Sci 1966, V11, P404 MEDLINE
- (110) Hall, L; Health Risk Assessment of
1,1,1-Trichloroethane (MC) in California Drinking
Water 1988, UCRL-21054
- (111) Hamilton, A; Industrial Toxicology 3rd ed 1974, P284
- (112) Hamilton, A; JAMA, J Am Med Assoc 1917, V69, P2037
- (113) Hanley, T; Propylene Dichloride: Dominant Lethal Study
in Sprague-Dawley Rats 1989
- (114) Hanley, T; Propylene Dichloride: Oral Teratology Study
in New Zealand White Rabbits 1989
- (115) Hanley, T; Toxicologist 1987, V7, P189
- (116) Hatfield, T; Arch Environ Health 1970, V20, P279
MEDLINE
- (117) Haworth, S; Environ Mutagen 1983, V5(Suppl 1), P3
- (118) Heller, S; Folia Morphol 1996, V25, P9
- (119) Heppel, L; J Ind Hyg Toxicol 1946, V28, P1 CAPLUS
- (120) Heppel, L; J Ind Hyg Toxicol 1948, V30, P189 CAPLUS
- (121) Hepple, L; J Biol Chem 1946, V176, P763
- (122) Hepple, R; J Army Med Corps 1927, V49, P442
- (123) Hes, J; Isr Ann Psychiatry Relat Discip 1979, V17(2),
P122 MEDLINE
- (124) Hofmann, H; Arch Toxicol 1971, V27, P244
- (125) Hogstedt, C; Br J Ind Med 1979, V36, P279
- (126) Hollingsworth, R; Am Ind Hyg Assoc J 1963, V24, P28
CAPLUS
- (127) Holmberg, B; Scand J Work Environ Health 1977, V3, P43
CAPLUS
- (128) Horvath, M; Activ Nerv Super 1973, V15, P25 CAPLUS
- (129) Humbert, B; CAPLUS
- (130) Humbert, B; Arch Mol Prof Med Trav Secur Soc 1977,
V38, P415 CAPLUS
- (131) Hutson, D; Food Cosmet Toxicol 1971, V9, P677 CAPLUS
- (132) Ikeda, N; Br J Ind Med 1972, V29, P99
- (133) Imbriani, M; Am J Ind Med 1988, V13, P211 CAPLUS
- (134) International Agency for Research on Cancer;
Monographs on the Evaluation of the Carcinogenic
Risk of Chemicals to Man 1976, V11
- (135) International Agency for Research on Cancer;
Monographs on the Evaluation of Carcinogenic Risks
to Humans 1987, V1 to 42(Suppl 7)
- (136) Irish, D; Industrial Hygiene and Toxicology 2nd rev ed
1962, V2
- (137) Ivanetich, K; Carcinogenesis 1981, V8, P697
- (138) Jakobson, I; Acta Pharmacol Toxicol 1977, V41, P497
CAPLUS
- (139) Jakobson, I; Acta Pharmacol Toxicol 1986, V59, P135
CAPLUS
- (140) Johnson, K; Neurotoxicologic Examination of Rats
Exposed to 1,2-Dichloropropane (DCP) via Gavage
for 13 Weeks 1988
- (141) Johnson, M; Biochem Pharmacol 1965, V14, P1383 CAPLUS
- (142) Jondorf, W; Biochem J 1957, V65, P14
- (143) Jones, A; Xenobiotica 1980, V9, P763
- (144) Jones, A; Xenobiotica 1980, V10, P835 CAPLUS
- (145) Jones, R; Arch Environ Health 1983, V38, P59 MEDLINE
- (146) Karimullina, N
- (147) Karimullina, N; Farmakol Toksikol 1969, V32, P165
CAPLUS
- (148) Kavlock, R; Fundam Cosmet Toxicol 1979, V12, P343
- (149) Kawai, T; Toxicol Lett 1991, V55, P39 CAPLUS
- (150) King, M; Mutat Res 1979, V66, P33 CAPLUS
- (151) Kirk, H; Propylene Dichloride: Oral Teratology Study

- in Sprague-Dawley Rats 1989
- (152) Kirk, H; Propylene Dichloride: Two Generation
Reproduction Study in Sprague-Dawley Rats 1990
 - (153) Klaassen, C; Biochem Pharmacol 1969, V18, P2019 CAPLUS
 - (154) Klaassen, C; Toxicol Appl Pharmacol 1966, V9, P139
CAPLUS
 - (155) Klaassen, C; Toxicol Appl Pharmacol 1967, V10, P119
CAPLUS
 - (156) Klaunig, J; Environ Health Perspect 1986, V69, P89
CAPLUS
 - (157) Kleinfeld, M; J Occup Med 1966, V8, P358 MEDLINE
 - (158) Klinkead, E; Gov Rep Announce Index 1987, 17
 - (159) Kochmann, M; Muench Med Wochenschr 1928, V75, P1334
CAPLUS
 - (160) Kosenko, A
 - (161) Kosenko, A; CAPLUS
 - (162) Kosenko, A; CAPLUS
 - (163) Kosenko, A; CAPLUS
 - (164) Kosenko, A
 - (165) Kosenko, A
 - (166) Kosenko, A; All-Union Rep 2nd 1972, P104 CAPLUS
 - (167) Kosenko, A; Farmakol Toksikol Nov Prod Khim Sint Mater
Res Konf 3rd 1974-1975, P174
 - (168) Kosenko, A; Mater Volzh Konf Fiziol Uchastiem Biokhim,
Farmakol Morfol 6th 1973, V2, P36 CAPLUS
 - (169) Kosenko, A; Toksikol Gig Prod Neftekhim Neftekhim
Proizvod Vses Knof 1971-1972, P205
 - (170) Kosenko, A; Toksikol Gig Prod Neftekhim Neftekhim
Proizvod, Vses Knof 2nd 1971-1972, P108
 - (171) Kramer, C; Arch Environ Health 1978, V33, P331 CAPLUS
 - (172) Kranz, J; Anesthesiology 1959, V20, P635
 - (173) Kraus, H; Vierteljahresschr Gerichtl Med Oeff
Sanitaetswes 1914, V48(3), P109
 - (174) Kronevi, T; CAPLUS
 - (175) Kronevi, T; Acta Pharmacol Toxicol 1977, V41, P298
CAPLUS
 - (176) Landry, T; Fundam Appl Toxicol 1982, V2, P230 CAPLUS
 - (177) Landry, T; Fundam Appl Toxicol 1989, V13, P516 CAPLUS
 - (178) Larcen, A; Pharmacol Toxicol 1976, V41, P131
 - (179) Lattanzi, G; J Toxicol Environ Health 1988, V24, P403
CAPLUS
 - (180) Lazarew, N; Naunyn-Schmiedeberg's Arch Exp Pathol
Pharmacol 1929, V141, P19
 - (181) Lehman, H; Toxicology and Hygiene of Industrial
Solvents 1943
 - (182) Lehmann, K; Arch Hyg Bakteriell 1936, V116, P131
 - (183) Leri, A; Bull Mem Soc Med Hop Paris 1922, V46, P1406
 - (184) Letz, G; J Am Med Assoc 1984, V252, P2428 MEDLINE
 - (185) Lin, E; Toxicol Appl Pharmacol 1985, V78, P428 CAPLUS
 - (186) Little, A; Recognition of Odor Threshold
Determinations of Ethyl Chloride 1985
 - (187) Lobo-Mendonca, R; Br J Ind Med 1963, V20, P50 CAPLUS
 - (188) Loew, G; Cancer Biochem Biophys 1984, V7, P109 CAPLUS
 - (189) Loveday, K; Environ Mol Mutagen 1989, V13, P60 CAPLUS
 - (190) Lucantoni, C; Toxicol Appl Pharmacol 1992, V117, P133
MEDLINE
 - (191) Lucas, G; J Pharm 1928, V34, P223 CAPLUS
 - (192) Luzhnikov, E; Sud Med Ekspert 1985, V28, P47
 - (193) MacDonald, J; Toxicol Lett 1982, V13, P57
CAPLUS
 - (194) Mant, A; Br Med J 1953, P655 MEDLINE
 - (195) Mattsson, J; Neurotoxicological Examination of Rats
Exposed to 1,1,1-Trichloroethane Vapor for 13

Weeks, Conducted for the Halogenated Solvents
Industry Alliance in Response to the US EPA
Federal Register No 162 1989-1991

- (196) McCall, S; Biochem Pharmacol 1983, V32(2), P207 CAPLUS
- (197) McLeod, A; Br Med J 1987, V294, P727 MEDLINE
- (198) McNutt, N; Lab Invest 1975, V32, P642 CAPLUS
- (199) Meneghini, R; Chem-Biol Interact 1974, V8, P113 CAPLUS
- (200) Mennear, J; Fundam Appl Toxicol 1982, V2, P82 CAPLUS
- (201) Menschick, H; Arch Gewerbepathol Gewerbehyg 1957, V15, P241 MEDLINE
- (202) Merzbach, L; Z Gesamte Exp Med 1928, V63, P383
- (203) Mirsalis, J; Environ Mol Mutagen 1989, V14, P155 CAPLUS
- (204) Mitoma, C; Drug Chem Toxicol 1985, V8, P183 CAPLUS
- (205) Monster, A; Int Arch Occup Environ Health 1979, V42, P293 CAPLUS
- (206) Monster, A; Kinetics of Chlorinated Hydrocarbons Solvents 1978
- (207) Morgan, A; Ann Occup Hyg 1970, V13, P219 CAPLUS
- (208) Morgan, A; Ann Occup Hyg 1972, V15, P273 CAPLUS
- (209) Morris, L; Anesthesiology 1953, V14, P153 CAPLUS
- (210) Mueller, J; Naunyn-Schmiedeberg's Arch Exp Pathol Pharmacol 1925, V109, P276
- (211) Mullin, L; Neurotoxicology 1982, V3, P126 CAPLUS
- (212) Muralidhara, S; Toxicologist 1986, V6(3/3)
- (213) Nachtomi, E; Biochem Pharmacol 1977, V26, P1941 CAPLUS
- (214) Nater, J; Contact Dermatitis 1976, V2, P227 MEDLINE
- (215) National Cancer Institute; Tech Rep Ser 1978, 86, P64
- (216) National Cancer Institute; Bioassay of 1,1,2-Trichloroethane for Possible Carcinogenicity 1978, NCI-CG-TR-74
- (217) National Cancer Institute; Carcinog Tech Rep Se 1978, 55
- (218) National Cancer Institute; Carcinog Tech Rep Ser 1977, 3
- (219) National Cancer Institute; NCI/NTP Tech Rep 1978, 066
- (220) National Cancer Institute; Tech Rep Ser 1978, 86
- (221) National Cancer Institute; Tech Rep Ser 1978, 68
- (222) National Cancer Institute; US NTIS PB Rep NCI-CG-TR-27
- (223) National Cancer Institute; US NTIS PB Rep 1978, 155PB-277453
- (224) National Fire Protection Association; Fire Protection Guide on Hazardous Materials 9th ed P49
- (225) National Fire Protection Association; Fire Protection Guide on Hazardous Materials 9th ed 1986, P325M-85
- (226) National Institute for Occupational Safety and Health; Criteria for a Recommended Standard - Occupational Exposure to Ethylene Dichloride (1,2-Dichloroethane) 1976
- (227) National Institute for Occupational Safety and Health; Curr Intell Bull 1978, 27
- (228) National Institute for Occupational Safety and Health; DHEW (NIOSH) Publ No 77-121 1976
- (229) National Institute for Occupational Safety and Health; Documentation for Immediately Dangerous to Life or Health Concentrations 1994, P208
- (230) National Institute for Occupational Safety and Health; Documentation for Immediately Dangerous to Life or Health Concentrations (IDLHs) 1994, P456
- (231) National Institute for Occupational Safety and Health; Pocket Guide to Chemical Hazards 1997
- (232) National Institute for Occupational Safety and Health; Registry of Toxic Effects of Chemical Substances

1985

- (233) National Institute for Occupational Safety and Health; Testimony of NIOSH on the Occupational Safety and Health Administration's Proposed Rule on Air Contaminants 1988
- (234) National Institute for Occupational Safety and Health; Testimony of NIOSH on the Occupational Safety and Health Administration's Proposed Rule on Air Contaminants: 29 CFR Part 1910 1988
- (235) National Institute for Occupational Safety and Health/Occupational Safety and Health Administration; Occupational Health Guidelines For Chemical Hazards: Guideline for Ethyl Bromide 1981, P1
- (236) National Toxicology Program; NIH Publ No 86-8519
- (237) National Toxicology Program; NIH Publ No 90-2801 1989, NTP TR 346
- (238) National Toxicology Program; NTP Publ No 87-220 1987
- (239) National Toxicology Program; NTP Publ No 87-307 1987
- (240) National Toxicology Program; Tech Rep 1986, 263, CAPLUS
- (241) National Toxicology Program; Technical Report on the Carcinogenesis Bioassay of 1,2-Dibromoethane (CAS 106-93-4) in F344 Rats and B6C3F1 Mice (Inhalation Study) 1982
- (242) National Toxicology Program; Technical Report on the Toxicology and Carcinogenesis Studies of Bromoethane 1989, CAS 74-96-4
- (243) National Toxicology Program; Technical Report on the Toxicology and Carcinogenesis Studies of Hexachloroethane in F344/N Rats 1989, NTP TR 361
- (244) National Toxicology Program; unpublished report submitted by contract laboratory 1983
- (245) Navrotskii, V
- (246) Navrotskii, V; Tr S'ezda Gig Ukr 1970-1971, V814, P224
- (247) Nestmann, E; Mutat Res 1980, V79, P203 CAPLUS
- (248) Nitschke, K; Fundam Appl Toxicol 1981, V1, P437 CAPLUS
- (249) Nitschke, K; Propylene Dichloride: A 13-week Inhalation Toxicity Study with Rats, Mice, and Rabbits 1988
- (250) Nitschke, K; Propylene Dichloride: One Day and Two Week Inhalation Toxicity in Rats, Mice, and Rabbits 1987
- (251) Nolan, R; Fundam Appl Toxicol 1984, V4, P654 CAPLUS
- (252) Nordin, C; Int J Addict 1988, V23(6), P623 MEDLINE
- (253) Norman, J; J Occup Med 1981, V23, P818
- (254) Northfield, R; J Soc Occup Med 1981, V31, P164 MEDLINE
- (255) Nylander, P; Mutat Res 1979, V64, P122
- (256) Olmstead, E; AMA Arch Ind Hyg Occup Med 1960, V21, P45
- (257) Ott, M; Br J Ind Med 1980, V37, P163 MEDLINE
- (258) Paolini, M; Toxicology 1992, V73, P101 CAPLUS
- (259) Pelkonen, O; FEBS Lett 1975, V51, P11 CAPLUS
- (260) Perocco, P; Cancer Lett 1981, V13, P213 CAPLUS
- (261) Petrova, N; Nauch Tr Irkutsk Gas Med Inst 1972, V115, P102
- (262) Pflessner, G; Arch Gewebepathol Gewerbehyg 1938, V8, P591 CAPLUS
- (263) Plaa, G; J Pharmacol Exp Ther 1958, V123, P224 CAPLUS
- (264) Plaa, G; Toxicol Appl Pharmacol 1965, V7, P37 CAPLUS
- (265) Plokhova, E; Gig Tr Prof Zabol 1966, V10, P51 CAPLUS
- (266) Plotnick, H; Res Commun Chem Pathol Pharmacol 1976, V13, P251 CAPLUS
- (267) Plotnikov, N; Farmakol Toksikol 1947, V10, P47 CAPLUS

- (268) Poirier, L; Cancer Res 1975, V35, P1411 CAPLUS
- (269) Pottenger, L; Toxicologist 1991, V11
- (270) Pozzani, U; Am Ind Hyg Assoc J 1959, V20, P364 CAPLUS
- (271) Pozzi, C; Br J Ind Med 1985, V42, P770 CAPLUS
- (272) Prendergast, J; Toxicol Appl Pharmacol 1967, V10, P270
CAPLUS
- (273) Price, N; NTIS Publ No PB-87-163-531 1978
- (274) Price, P; In Vitro 1978, V14, P290 CAPLUS
- (275) Quast, J; Fundam Appl Toxicol 1988, V11, P611 CAPLUS
- (276) Quast, J; Interim Report 1975
- (277) Quast, J; Interim Report after 24 Months 1978
- (278) Rampy, L; Proc Int Cong Toxicol 1977
- (279) Rannug, U; Chem Biol Interact 1978, V20, P1 CAPLUS
- (280) Rao, K; Banbury Rep V5
- (281) Ratcliffe, J; Br J Ind Med V44
- (282) Reesal, M; J Am Med Assoc 1985, V254, P3181 MEDLINE
- (283) Reinhardt, C; Arch Environ Health 1971, V22, P265
MEDLINE
- (284) Reinhardt, C; Arch Environ Health 1971, V22, P265
MEDLINE
- (285) Reitz, R; Toxicol Appl Pharmacol 1988, V95, P185
CAPLUS
- (286) Reynolds, E; Lab Invest 1968, V19, P273 CAPLUS
- (287) Reznick, G; Arch Toxicol 1980, V46, P233
- (288) Reznikov, A; Pharmacol Toxicol 1945, V8, P58 CAPLUS
- (289) Riddle, B; Toxicologist 1981, V1, P26
- (290) Riikhimaki, V; Biol Abstr HEBP V79, P00239
- (291) Riikhimaki, V; Scand J Work Environ Health 1978, V4,
P73 CAPLUS
- (292) Rosengren, L; Scand J Work Environ Health 1985, V11,
P447 CAPLUS
- (293) Rosenkrantz, H; Environ Health Perspect 1977, V21, P79
- (294) Rosenkrantz, H; Mutant Res 1976, V41, P61
- (295) Rowe, V; AMA Arch Ind Hyg Occup Med 1952, V6, P1958
- (296) Rubin, D; West J Med 1988, V148(1), P78
- (297) Saito-Suzuki, R; Mutat Res 1982, V101, P321 CAPLUS
- (298) Salvini, M; Br J Ind Med 1971, V28, P293 CAPLUS
- (299) Sanders, V; Drug Chem Toxicol 1985, V8(5), P357 CAPLUS
- (300) Savolainen, H; Arch Toxicol 1977, V38, P229 CAPLUS
- (301) Sax, N; Dangerous Properties of Industrial Materials
7th ed 1989, V3(PAW500), P2663
- (302) Sax, N; Dangerous Properties of Industrial Materials
7th ed 1989, V2, P50
- (303) Sax, N; Dangerous Properties of Industrial Materials
7th ed 1989, V2(ACK250), P50
- (304) Sayers, R; US Public Health Bull 1929, V185
- (305) Sayers, R; US Public Health Bull 1929, V185, P1
- (306) Scherbatscheff, D; Arch Exp Pathol Pharmacol 1902,
V47, P1
- (307) Scherling, S; Mil Surg 1945, V96, P70 CAPLUS
- (308) Schmidt, P; Int Arch Arbeitsmed 1972, V30, P283
MEDLINE
- (309) Schmidt, R; CAPLUS
- (310) Schmidt, R; Biol Rundsch 1976, V14, P220 CAPLUS
- (311) Schultze, E; Berl Klin Wochenschr 1920, V57, P941
- (312) Schumann, A; Fundam Appl Toxicol 1982, V2, P27 CAPLUS
- (313) Schumann, A; Toxicologist 1984, V4, P111
- (314) Schwander, P; Arch Gewerpathol Gewerbehyg 1936, V7,
P109 CAPLUS
- (315) Schwart, J; Arch Dermatol Syphilol 1939, V40, P962
- (316) Schwetz, B; Toxicol Appl Pharmacol 1974, V28, P452
CAPLUS
- (317) Schwetz, B; Toxicol Appl Pharmacol 1975, V32, P84

CAPLUS

- (318) Scortichini, B; Ethyl Chloride: Inhalation Teratology Study in CF-1 Mice 1986
- (319) Seidenberg, J; Teratog, Carcinog, Mutagen 1987, V7, P17 CAPLUS
- (320) Shaipak, V
- (321) Shaipak, V; Sb Tr-Naicho-Issled Inst Gig Tr Propzabol Im N I Makhvi ladze 1976, V15, P194 CAPLUS
- (322) Shakarnis, V; Sov Genet 1969, V5, P1666
- (323) Shakarnis, V; Vestn Leningr Univ Ser Biol 1970, V25, P153
- (324) Sherman, J; J Trop Med Hyg 1953, V56, P139 MEDLINE
- (325) Shirokov, O; Gig Sanit 1976, V7, P107
- (326) Short, R; Toxicol Appl Pharmacol 1978, V46, P173 CAPLUS
- (327) Simmon, V; Am Assoc Cancer Res 1976, V17, P85
- (328) Simmon, V; Progress in Genetic Toxicology 1977, P249 CAPLUS
- (329) Smyth, H; Am Ind Hyg Assoc Q 1956, V17, P129
- (330) Spencer, H; Ind Hyg Occup Med 1951, V4, P482 CAPLUS
- (331) Stahl, C; J Forensic Sci 1969, V14, P393 MEDLINE
- (332) Steindorff, K; Albrocht von Graefes Arch Ophthalmol 1922, V109, P252 CAPLUS
- (333) Stewart, R; 1,1,1-Trichloroethane: Development of a Biological Standard for the Industrial Worker by Breath Analysis 1975
- (334) Stewart, R; Am Ind Hyg Assoc J 1961, V22, P252 CAPLUS
- (335) Stewart, R; Am Ind Hyg Assoc J 1964, V25, P439 CAPLUS
- (336) Stewart, R; Ann Occup Hyg 1968, V11, P71 CAPLUS
- (337) Stewart, R; Arch Environ Health 1969, V19, P467 MEDLINE
- (338) Stewart, R; Ind Hyg J 1964, V25, P439 CAPLUS
- (339) Stott, W; Fundam Appl Toxicol 1984, V4, P594 CAPLUS
- (340) Sweeney, M; Arch Environ Health 1986, V41, P23 MEDLINE
- (341) Symth, H; Am Ind Hyg Assoc J 1969, V30, P470
- (342) Tachizawa, H; Mol Pharmacol 1982, V22, P745 CAPLUS
- (343) Taylor, G; Personal communication from G Taylor 1978
- (344) The Dow Chemical Co; Material Safety Data Sheet for Ethyl Bromide 1988, P1
- (345) Theiss, J; Cancer Res 1977, V37, P2717 CAPLUS
- (346) Thomas, B; Public Health Rep 1927, V1139, P370
- (347) Thompson, J; Chem-Biol Interact 1984, V51, P321 CAPLUS
- (348) Thomson, A; Biochem J 1958, V69, P23
- (349) Thorpe, E; Comp Pathol Ther 1965, V75, P45 CAPLUS
- (350) Timchalk, C; Toxicology 1991, V68, P291 CAPLUS
- (351) Torkelson, T; Am Ind Hyg Assoc J 1958, V19, P353 MEDLINE
- (352) Torkelson, T; Patty's Industrial Hygiene and Toxicology 1994, V2, P4087
- (353) Torkelson, T; Patty's Industrial Hygiene and Toxicology 3rd rev ed 1981, V2B, P3502
- (354) Town, C; Drug Metab Dispos 1984, V12, P4 CAPLUS
- (355) Troshina, M; Gig Tr Prof Zabol 1966, V10, P37 CAPLUS
- (356) Troshina, M; Toksikol Novykh Prom Khim Veshchestv 1964, V6, P45
- (357) Truffert, L; Arch Mal Prof Med Trav Secur Soc 1977, V38, P261 CAPLUS
- (358) Truhaut, R; Arch Mal Prof Med Trav Secur Soc 1974, V35, P593 CAPLUS
- (359) Tsuruta, H; Ind Health 1975, V13, P227 CAPLUS
- (360) Tu, A; Cancer Lett 1985, V28, P85 CAPLUS
- (361) Turnia, M; Res Commun Chem Pathol Pharmacol 1989, V63, P81

- (362) US Environmental Protection Agency; Dermal Exposure Assessment: Principles and Applications 1992, EPA/600/8-91/011B
- (363) US Environmental Protection Agency; Health Assessment Document for 1,1,1-Trichloroethane 1984, EPA-600/8-82-003F.1-55-6
- (364) US Environmental Protection Agency; Health Effects Assessment for 1,1,1-Trichloroethane 1984
- (365) US Environmental Protection Agency; Health and Environmental Effects Profile for Dichloroethanes 1985, EPA/600/x-85/359
- (366) US Environmental Protection Agency; Integrated Risk Information system
- (367) US Environmental Protection Agency; NTIS Publ No PB-84-183-565 1984, EPA-600/8-82-003F
- (368) VanDyke, R; Biochem Pharmacol 1971, V20, P463 CAPLUS
- (369) VanDyke, R; Environ Health Perspect 1977, V21, P121 CAPLUS
- (370) VanDyke, R; Mol Pharmacol 1975, V11, P809 CAPLUS
- (371) Van Duuren, B; J Natl Cancer Inst 1979, V63, P1433 CAPLUS
- (372) Van Haaften, A; Am Ind Hyg Assoc J 1969, V30, P251 CAPLUS
- (373) Van Ketel, W; Contact Dermatitis 1976, V2, P115 MEDLINE
- (374) Vernot, F; Toxicol Appl Pharmacol 1972, V42, P417
- (375) Volp, R; Toxicologist 1988, V8
- (376) von Oettingen, W; J Ind Hyg Toxicol 1937, V19, P391
- (377) von Oettingen, W; The Halogenated Aliphatic, Olefinic, Cyclic, Aromatic, and Aliphatic-Aromatic-Hydrocarbons including the Halogenated Insecticides, Their Toxicity and Potential Dangers 1955
- (378) Vozovaya, M; Gig Sanit 1974, V7, P25
- (379) Wahlberg, J; Ann Occup Hyg 1976, V19, P115 CAPLUS
- (380) Wahlberg, J; Scand J Work Environ Health 1984, V10, P159 CAPLUS
- (381) Waite, C; Public Health Rep 1927, V43, P417
- (382) Watrous, R; Br J Ind Med 1947, V4, P111 CAPLUS
- (383) Watrous, W; Toxicol Appl Pharmacol 1972, V23, P640 CAPLUS
- (384) Weeks, M; Am Ind Hyg Assoc J 1979, V40, P187 CAPLUS
- (385) Weisburger, E; Environ Health Perspect 1977, V21, P7 CAPLUS
- (386) White, K; Drug Chem Toxicol 1985, V8(5), P333 CAPLUS
- (387) Willcox, W; Trans Med Soc London 1915, V38, P129
- (388) Williams, G; Mutat Res 1982, V97(5), P359 CAPLUS
- (389) Wolf, K; J Hazard Mater 1987, V15(1), P137
- (390) Wong, L; Toxicol Appl Pharmacol 1982, V63, P155 CAPLUS
- (391) Wong, O; Am J Ind Med 1985, V7, P295 MEDLINE
- (392) Woolverton, W; Toxicol Appl Pharmacol 1981, V59, P1 CAPLUS
- (393) Wright, W; Am J Hyg 1932, V16, P325
- (394) Yllner, S; Acta Pharmacol Toxicol 1971, V30, P248 CAPLUS
- (395) Yllner, S; Acta Pharmacol Toxicol 1971, V29, P481 CAPLUS
- (396) Yllner, S; Acta Pharmacol Toxicol 1971, V29, P499 CAPLUS
- (397) York, R; Toxicologist 1981, V1, P28
- (398) Zollinger, F; Arch Gewerbepathol Gewerbehyg 1931, V2, P298

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ABSTRACT:

Asthma is now described as being characterized by reversible airflow obstruction, with bronchial inflammation and tissue remodelling of the airway wall. The description of remodelling has been usefully invoked to account for a component of airflow obstruction that is unresponsive to usual bronchodilator therapy. It is crucial to examine critically the evidence for this view, particularly the quantitation of specific changes in the epithelium, mucus glands, cell infiltrate, collagen, vessels and smooth muscle of the bronchial wall. The useful tools of immunohistochem. and mol. biol. combined with airway biopsy and well-designed clin. trials will be essential to determine the specific roles of cells and cytokines in airway remodelling in asthma. (C) 2001 Academic Press. (c) 2001 Academic Press.

REFERENCE COUNT: 218 THERE ARE 218 CITED REFERENCES AVAILABLE FOR THIS RECORD.

- REFERENCE(S):
- (1) Ackerman, V; Chest 1994, V105(3), P687 MEDLINE
 - (2) Adamis, A; Am J Pathol 1991, V139(5), P961 CAPLUS
 - (3) Adelroth, E; Am Rev Respir Dis 1990, V142(1), P91 MEDLINE
 - (4) Agius, R; Thorax 1985, V40(10), P760 MEDLINE
 - (5) Aikawa, T; Chest 1992, V101(4), P916 MEDLINE
 - (6) Anonymous; Am Rev Respir Dis 1985, V132(1), P180
 - (7) Anonymous; Eur Respir J 1992, V5(1), P115
 - (8) Asher, M; Eur Respir J 1995, V8(3), P483 MEDLINE
 - (9) Azzawi, M; Am Rev Respir Dis 1990, V142(6 Pt 1), P1407 MEDLINE
 - (10) Azzawi, M; Am Rev Respir Dis 1992, V145(6), P1477 MEDLINE
 - (11) Bai, T; Am Rev Respir Dis 1990, V141(3), P552 MEDLINE
 - (12) Barnes, P; Am J Respir Crit Care Med 1994, V150(5 Pt 2), PS42 MEDLINE
 - (13) Barnes, P; Bronchial Asthma, 3rd ed 1993, P80
 - (14) Barnes, P; Lancet 1986, V1(8475), P242 MEDLINE
 - (15) Barnes, P; Pharmacol Rev 1988, V40(1), P49 CAPLUS
 - (16) Beasley, R; Am Rev Respir Dis 1989, V139(3), P806 MEDLINE
 - (17) Bellini, A; J Allergy Clin Immunol 1993, V92(3), P412 MEDLINE
 - (18) Bjork, J; Eur J Pharmacol 1983, V96(1-2), P87 MEDLINE
 - (19) Blosser, S; J Applied Physiol 1994, V76(4), P1624 MEDLINE
 - (20) Boezen, H; Thorax 1995, V50(2), P121 MEDLINE
 - (21) Bousquet, J; Int Arch Allergy Immunol 1995, V107(1-3), P211 MEDLINE
 - (22) Bousquet, J; N Engl J Med 1990, V323(15), P1033 MEDLINE
 - (23) Bradding, P; Am J Respir Cell Mol Biol 1994, V10(5), P471 CAPLUS
 - (24) Bradding, P; J Immunol 1995, V155(1), P297 CAPLUS

- (25) Bradley, B; J Allergy Clin Immunol 1991, V88(4), P661
MEDLINE
- (26) Braun, R; Eur J Immunol 1993, V23(4), P956 CAPLUS
- (27) Brewster, C; Am J Respir Cell Mol Biol 1990, V3(5),
P507 MEDLINE
- (28) Broide, D; J Clin Invest 1991, V88(3), P1048 MEDLINE
- (29) Brown, P; Lancet 1991, V338(8767), P590 MEDLINE
- (30) Bruynzeel, P; Pharmacol Res Commun 1986, V18(Suppl),
P61
- (31) Burrows, B; N Engl J Med 1989, V320(5), P271 MEDLINE
- (32) Cambrey, A; Environmental impact on the airways:from
injury to repair 1996, P183 CAPLUS
- (33) Capron, M; Int Arch Allergy Applied Immunol 1989,
V88(1-2), P54 CAPLUS
- (34) Capron, M; J Immunol 1984, V132(1), P462 CAPLUS
- (35) Carroll, N; Am J Respir Crit Care Med 1997, V155(2),
P689 MEDLINE
- (36) Carroll, N; Am Rev Respir Dis 1993, V147(2), P405
MEDLINE
- (37) Carroll, N; Eur Respir J 1996, V9(4), P709 MEDLINE
- (38) Carroll, N; Eur Respir J 1997, V10(2), P292 MEDLINE
- (39) Casale, T; J Clin Invest 1987, V79(4), P1197 MEDLINE
- (40) Chediak, A; Respir Physiol 1991, V84(2), P231 CAPLUS
- (41) Chetta, A; Am J Respir Crit Care Med 1996, V153(3),
P910 MEDLINE
- (42) Chetta, A; Chest 1997, V111(4), P852 MEDLINE
- (43) Columbo, M; J Immunol 1992, V149(2), P599 CAPLUS
- (44) Connolly, D; J Clin Invest 1989, V84(5), P1470 CAPLUS
- (45) Corrigan, C; Am Rev Respir Dis 1990, V141(4 Pt 1), P970
MEDLINE
- (46) Corrigan, C; Am Rev Respir Dis 1993, V147(3), P540
MEDLINE
- (47) Corrigan, C; Lancet 1988, V1(8595), P1129 MEDLINE
- (48) Cromwell, O; Immunology 1992, V77(3), P330 CAPLUS
- (49) Cuss, F; Lancet 1986, V2(8500), P189 MEDLINE
- (50) Dahlen, S; Nature 1980, V288(5790), P484 CAPLUS
- (51) Desreumaux, P; J Exp Med 1992, V175(1), P293 CAPLUS
- (52) Devalia, J; Am J Respir Cell Mol Biol 1993, V9(3), P271
CAPLUS
- (53) Djukanovic, R; Am Rev Respir Dis 1990, V142(2), P434
MEDLINE
- (54) Djukanovic, R; Am Rev Respir Dis 1990, V142(4), P863
MEDLINE
- (55) Djukanovic, R; Am Rev Respir Dis 1991, V143(4 Pt 1),
P772 MEDLINE
- (56) Djukanovic, R; Am Rev Respir Dis 1992, V145(3), P669
MEDLINE
- (57) Djukanovic, R; Eur Respir J 1992, V5(5), P538 MEDLINE
- (58) Dunnill, M; J Clin Pathol 1960, V13, P27 MEDLINE
- (59) Dunnill, M; Thorax 1969, V24(2), P176 MEDLINE
- (60) D'Amore, P; Am J Respir Cell Mol Biol 1992, V6(1), P1
CAPLUS
- (61) Ebina, M; Am Rev Respir Dis 1993, V148(3), P720 MEDLINE
- (62) Elwood, W; Am Rev Respir Dis 1992, V145(6), P1289
CAPLUS
- (63) Ernst, P; JAMA 1992, V268(24), P3462 MEDLINE
- (64) Faniran, A; Chest 1999, V115(2), P434 MEDLINE
- (65) Faul, J; Eur Respir J 1997, V10(2), P301 MEDLINE
- (66) Fels, A; J Applied Physiol 1986, V60(2), P353 CAPLUS
- (67) Flint, K; Br Med J (Clinical Research Ed) 1985,
V291(6500), P923 MEDLINE
- (68) Fukuda, T; Ann Allergy Asthma Immunol 1995, V75(1), P65
MEDLINE

- (69) Fuller, R; Clin Exp Immunol 1986, V65(2), P416 CAPLUS
- (70) Gauldie, J; Ann NY Acad Sci 1989, V557, P46 CAPLUS
- (71) Gavett, S; Am J Respir Cell Mol Biol 1994, V10(6), P587
MEDLINE
- (72) Gerblich, A; N Engl J Med 1984, V310(21), P1349 MEDLINE
- (73) Gleich, G; J Allergy Clin Immunol 1988, V81(5 Pt 1),
P776 MEDLINE
- (74) Gleich, G; J Allergy Clin Immunol 1990, V85(2), P422
MEDLINE
- (75) Glynn, A; Thorax 1960, V15, P142 MEDLINE
- (76) Glynn, A; Thorax 1960, V15, P142 MEDLINE
- (77) Godard, P; Bulletin Europeen de Physiopathologie
Respiratoire 1987, V23(1), P73 MEDLINE
- (78) Goldstein, R; Endocrinology 1989, V124(2), P964 CAPLUS
- (79) Gordon, J; Immunol Today 1990, V11(12), P458 CAPLUS
- (80) Greaves, J; Aust NZ J Med 1985, V15, P427
- (81) Haahtela, T; Clin Exp Allergy 1997, V27(4), P351
MEDLINE
- (82) Haahtela, T; N Engl J Med 1991, V325(6), P388 MEDLINE
- (83) Haahtela, T; N Engl J Med 1994, V331(11), P700 MEDLINE
- (84) Hamid, Q; Blood 1992, V80(6), P1496 CAPLUS
- (85) Hamid, Q; J Clin Invest 1991, V87(5), P1541 CAPLUS
- (86) Heise, C; J Biol Chem 2000, V275(39), P30531 CAPLUS
- (87) Henderson, W; Am Rev Respir Dis 1987, V135(5), P1176
CAPLUS
- (88) Holgate, S; Chest 1993, V103(2 Suppl), P125S MEDLINE
- (89) Holgate, S; Q J Med 1988, V66(249), P5 MEDLINE
- (90) Huber, H; Arch Intern Med 1922, V30, P689
- (91) Irani, A; Allergy 1989, V44(9), P31
- (92) Irani, A; Proc Nat Acad Sci USA 1986, V83(12), P4464
CAPLUS
- (93) James, A; Airway remodelling in the pathogenesis of
asthma 1997, P1
- (94) James, A; Am Rev Respir Dis 1989, V139(1), P242 MEDLINE
- (95) Jeffery, P; Am J Respir Crit Care Med 1994, V150(5 Pt
2), PS6 MEDLINE
- (96) Jeffery, P; Am Rev Respir Dis 1989, V140(6), P1745
MEDLINE
- (97) Jenkins, M; BMJ 1994, V309(6947), P90 MEDLINE
- (98) Johns, D; J Applied Physiol 2000, V88(4), P1413 MEDLINE
- (99) Johnston, R; N Engl J Med 1988, V318(12), P747
- (100) Jordana, M; Am Rev Respir Dis 1988, V137(3), P579
MEDLINE
- (101) Kelly, C; Clin Exper Allergy 1989, V19(2), P169
MEDLINE
- (102) Kelly, W; Am Rev Respir Dis 1988, V138(1), P26 MEDLINE
- (103) Kelly, W; BMJ (Clinical Research Ed) 1987, V294(6579),
P1059 MEDLINE
- (104) Khalil, N; Journal of Experimental Medicine 1989,
V170(3), P727 CAPLUS
- (105) Kirby, J; Am Rev Respir Dis 1987, V136(2), P379
MEDLINE
- (106) Kishimoto, T; Progress in Immunology 1989, P633
- (107) Kita, H; J Exp Med 1991, V174(3), P745 CAPLUS
- (108) Kohase, M; J Interferon Res 1988, V8(4), P559 CAPLUS
- (109) Kountz, W; Archives of pathology 1928, V5, P1003
- (110) Kovacs, E; Immunol Today 1991, V12(1), P17 CAPLUS
- (111) Kroegel, C; Immunology 1988, V64(3), P559 CAPLUS
- (112) Kuwano, K; Am Rev Respir Dis 1993, V148(5), P1220
MEDLINE
- (113) Kuzu, I; J Clin Pathol 1992, V45(2), P143 MEDLINE
- (114) Kwon, O; Immunology 1994, V81(3), P389 CAPLUS
- (115) Lai, C; Clin Immunol Allergy 1988, P37

- (116) Laitinen, A; Am J Respir Crit Care Med 1997, V156(3), P951
- (117) Laitinen, L; Am Rev Respir Dis 1985, V131(4), P599
MEDLINE
- (118) Laitinen, L; Am Rev Respir Dis 1987, V135(6 Pt 2), PS67 MEDLINE
- (119) Laitinen, L; Br J Pharmacol 1987, V92(4), P703 CAPLUS
- (120) Lam, S; J Allergy Clin Immunol 1987, V80(1), P44
MEDLINE
- (121) Lambert, R; J Applied Physiol 1993, V74(6), P2771
MEDLINE
- (122) Lambert, R; J Applied Physiol 1994, V77(3), P1206
MEDLINE
- (123) Lee, K; Am J Respir Crit Care Med 1998, V157, PA840
- (124) Levenson, T; Chest 1996, V110(3), P604 MEDLINE
- (125) Li, X; Airway remodelling in the pathogenesis of asthma 1997, P111
- (126) Li, X; Am J Respir Crit Care Med 1997, V156(1), P229
MEDLINE
- (127) Lopez, A; J Clin Invest 1986, V78(5), P1220 CAPLUS
- (128) Lopez, A; J Exp Med 1988, V167(1), P219 CAPLUS
- (129) Lopez, A; Proc Nat Acad Sci USA 1987, V84(9), P2761
CAPLUS
- (130) Lozewicz, S; Thorax 1990, V45(1), P12 MEDLINE
- (131) Macdermot, J; Prostaglandins 1984, V27(2), P163 CAPLUS
- (132) Macdonald, I; Ann Internal Med 1932, V6, P253
- (133) Mackaness, G; Semin Hematol 1970, V7(2), P172 MEDLINE
- (134) Macklem, P; Chest 1987, V91(6 Suppl), P189S MEDLINE
- (135) Marini, M; Am J Respir Cell Mol Biol 1991, V4(6), P519
CAPLUS
- (136) Marom, Z; J Clin Invest 1981, V67(6), P1695 CAPLUS
- (137) McCarter, J; Arch Pathol 1966, V82(4), P328 MEDLINE
- (138) McDonald, D; Am Rev Respir Dis 1987, V136(6 Pt 2), PS65 MEDLINE
- (139) Meinl, M; Pathol Res Pract 1980, V169(1), P21 MEDLINE
- (140) Metcalf, D; Cancer 1990, V65(10), P2185 MEDLINE
- (141) Mitzner, W; Chest 1995, V107(3 Suppl), P97S MEDLINE
- (142) Montefort, S; Thorax 1992, V47(7), P499 MEDLINE
- (143) Moqbel, R; J Exp Med 1991, V174(3), P749 CAPLUS
- (144) Moreno, R; Am Rev Respir Dis 1986, V133(6), P1171
MEDLINE
- (145) Motojima, S; Allergy 1993, V48(17 Suppl), P98 MEDLINE
- (146) Nakajima, H; Am Rev Respir Dis 1992, V146(2), P374
CAPLUS
- (147) Nathan, C; J Clin Invest 1987, V79(2), P319 CAPLUS
- (148) Nathan, C; J Exp Med 1984, V160(2), P600 CAPLUS
- (149) Naylor, B; Thorax 1962, V17, P69 MEDLINE
- (150) Nicod, L; Thorax 1993, V48, P660 MEDLINE
- (151) Norrby, K; Virchows Archiv B, Cell Pathology Including
Molecular Pathology 1980, V34(1), P13 CAPLUS
- (152) North, R; J Immunol 1978, V121(3), P806 CAPLUS
- (153) Ohno, I; Am J Respir Cell Mol Biol 1996, V15(3), P404
CAPLUS
- (154) Ohno, I; J Clin Invest 1992, V89(5), P1662 MEDLINE
- (155) Okazawa, M; Am J Respir Crit Care Med 1996, V154(5), P1557 MEDLINE
- (156) Olsen, V; Am J Respir Crit Care Med 1998, V157, PA133
- (157) Oswald, H; BMJ 1994, V309(6947), P95 MEDLINE
- (158) Oswald, H; Pediatric Pulmonology 1997, V23(1), P14
MEDLINE
- (159) Panhuysen, C; Am J Respir Crit Care Med 1997, V155(4), P1267 MEDLINE
- (160) Panhuysen, C; Am J Respir Crit Care Med 1997, V156(2)

Pt 1), P674

- (161) Peat, J; Eur J Respir Dis 1987, V70(3), P171 MEDLINE
- (162) Pincus, S; Blood 1987, V70(2), P572 MEDLINE
- (163) Plaut, M; Nature 1989, V339(6219), P64 CAPLUS
- (164) Rankin, J; J Allergy Clin Immunol 1989, V83(4), P722 MEDLINE
- (165) Redington, A; Thorax 1997, V52(4), P310 MEDLINE
- (166) Rennard, S; The Lung:Scientific Foundation 1991, P157
- (167) Richman, P; J Clin Pathol 1987, V40(6), P593 MEDLINE
- (168) Robinson, D; N Engl J Med 1992, V326(5), P298 MEDLINE
- (169) Robinson, D; Thorax 1993, V48(8), P845 MEDLINE
- (170) Roche, W; Am J Pathol 1985, V119(1), P57 MEDLINE
- (171) Roche, W; Lancet 1989, V1(8637), P520 MEDLINE
- (172) Rubin, A; Am Rev Respir Dis 1987, V136(5), P1145 CAPLUS
- (173) Saetta, M; Am Rev Respir Dis 1991, V143(1), P138 MEDLINE
- (174) Schleimer, R; Clin Rev Allergy 1983, V1(3), P327 CAPLUS
- (175) Schwartz, L; J Immunol 1987, V138(8), P2611 CAPLUS
- (176) Selroos, O; Chest 1995, V108(5), P1228 MEDLINE
- (177) Sherrill, D; Am Rev Respir Dis 1992, V145(5), P1136 MEDLINE
- (178) Shimokado, K; Cell 1985, V43(1), P277 CAPLUS
- (179) Simonson, M; J Clin Invest 1989, V83(2), P708 CAPLUS
- (180) Siraganian, R; Encyclopaedia of Immunology 1992, P1035
- (181) Skalli, O; Lab Invest 1989, V60(2), P275 MEDLINE
- (182) Soderberg, M; Eur Respir J 1990, V3(3), P261 MEDLINE
- (183) Sont, J; Am J Respir Crit Care Med 1999, V159, P1043 MEDLINE
- (184) Spiegelberg, H; Adv Immunol 1984, V35, P61 CAPLUS
- (185) Stewart, A; Adv Pharmacol 1995, V33, P209 CAPLUS
- (186) Stewart, A; Br J Pharmacol 1997, V121(3), P361 CAPLUS
- (187) Stiles, A; Am J Respir Cell Mol Biol 1989, V1(1), P21 CAPLUS
- (188) Strieter, R; Biochem Biophys Res Commun 1989, V162(2), P694 CAPLUS
- (189) Sumpio, B; J Vascular Surgery 1987, V6(3), P252 MEDLINE
- (190) Sur, S; Am Rev Respir Dis 1993, V148(3), P713 MEDLINE
- (191) Svensjo, E; Acta Physiologica Scandinavica 1977, V101(4), P504 CAPLUS
- (192) Synek, M; Am J Respir Crit Care Med 1996, V154(1), P224 MEDLINE
- (193) Takizawa, T; Am Rev Respir Dis 1971, V104(3), P331 MEDLINE
- (194) Taylor, K; Thorax 1987, V42(6), P452 MEDLINE
- (195) Toelle, B; J Asthma 1997, V34(2), P161 MEDLINE
- (196) Tomioka, M; Am Rev Respir Dis 1984, V129(6), P1000 MEDLINE
- (197) Tosi, M; Am J Respir Cell Mol Biol 1992, V7(2), P214 CAPLUS
- (198) Tracey, M; Am J Respir Crit Care Med 1995, V151(3 Pt 1), P656 MEDLINE
- (199) Trigg, C; Am J Respir Crit Care Med 1994, V150(1), P17 MEDLINE
- (200) Ulrik, C; Journal of Asthma 1994, V31(1), P35 MEDLINE
- (201) van Oosterhout, A; Am Rev Respir Dis 1993, V147(3), P548 CAPLUS
- (202) Walker, C; Am Rev Respir Dis 1992, V146(1), P109 MEDLINE
- (203) Walker, C; J Allergy Clin Immunol 1991, V88(6), P935 MEDLINE

- (204) Warner, J; Pediatr Allergy Immunol 1998, V9(2), P56
MEDLINE
- (205) Wegner, C; Science 1990, V247(4941), P456 CAPLUS
- (206) Weiss, S; Am Rev Respir Dis 1992, V145(1), P58 MEDLINE
- (207) Weller, P; N Engl J Med 1991, V324(16), P1110 MEDLINE
- (208) Wiggs, B; Am Rev Respir Dis 1992, V145(6), P1251
MEDLINE
- (209) Williams, H; BMJ 1969, V4(679), P321
- (210) Wilson, J; Airway Remodelling 1999, P113
- (211) Wilson, J; Airway wall remodelling in asthma 1997, P65
- (212) Wilson, J; Am J Respir Crit Care Med 1994, V149(1),
P86 MEDLINE
- (213) Wilson, J; Am Rev Respir Dis 1992, V145(4 Pt 1), P958
MEDLINE
- (214) Wilson, J; Am Rev Respir Dis 1993, V148(3), P806
MEDLINE
- (215) Wilson, J; Clin Exp Allergy 1997, V27(4), P363 CAPLUS
- (216) Ying, S; Clin Exp Allergy 1991, V21(6), P745 MEDLINE
- (217) Zheng, L; Am J Respir Crit Care Med 1997, V155(6),
P2072 MEDLINE
- (218) Ziesche, R; N Engl J Med 1999, V341(17), P1264 CAPLUS

L22 ANSWER 7 OF 9 CAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 2000:636245 CAPLUS

ENTRY DATE: Entered STN: 13 Sep 2000

TITLE: Apparatus for forming voids under concrete floors

INVENTOR(S): Rosenblat, Michael L.; Isles, Timothy J.; Dufault,
Louis C.

PATENT ASSIGNEE(S): Void Form International Ltd., Can.

SOURCE: U.S., 9 pp.
CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

INT. PATENT CLASSIF.:
MAIN: B28B007-28
SECONDARY: B28B007-34

US PATENT CLASSIF.: 249184000; 249DIG2; 249061000; 249185000; 052792100;
052795100; 493964000; 493966000; 493390000; 229120170

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6116568	A	20000912	US 1998-70302	19980430
PRIORITY APPLN. INFO.:			US 1998-71974P	P 19980120

PATENT CLASSIFICATION CODES:

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 6116568	ICM	B28B007-28
	ICS	B28B007-34
	INCL	249184000; 249DIG2; 249061000; 249185000; 052792100; 052795100; 493964000; 493966000; 493390000; 229120170
	IPCI	B28B0007-28 [ICM, 7]; B28B0007-34 [ICS, 7]
	IPCR	B28B0007-28 [I,C*]; B28B0007-28 [I,A]; E02D0027-01 [I,C*]; E02D0027-01 [I,A]; E04G0009-08 [I,C*]; E04G0009-08 [I,A]; E04G0009-10 [I,C*]; E04G0009-10 [I,A]
	NCL	249/184.000; 052/792.100; 052/795.100; 229/120.170; 229/120.250; 229/120.360; 249/061.000; 249/185.000; 249/DIG.002; 493/390.000; 493/964.000; 493/966.000
	ECLA	B28B007/28; E02D027/01; E04G009/08; E04G009/10

ABSTRACT:

A reinforced box-like structure for forming a void area in a concrete

formation. The structure includes a bottom panel having a plurality of spaced apart, parallel base partitions and a top panel having a plurality of spaced apart, parallel top partitions. The base partitions extend across the bottom panel and in a direction normal to the bottom panel, and the top partitions extend across the top panel and in a direction normal to the top panel. Each of the base partitions and top partitions include a plurality of double-thickness walls with a plurality of slots therein and flat top edges between the slots. The structure is assembled by superimposing the top panel over the bottom panel such that the base partitions extend transversely relative to the top partitions. Thus, the slots in the base partitions register in interlocking relationship with the corresponding slots in the top partitions, wherein the base partitions extend substantially to the top panel and the top partitions extend substantially to the bottom panel to create a cellular box-like structure that generally fills a space between the bottom panel and top panel with the flat top edges engaging the respective top or bottom partition.

REFERENCE COUNT: 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD.

REFERENCE(S): (1) Advertisement Of Gates & Sons Inc; Gates Sure-Void 1996
(2) Andersen; US 5506046 1996 CAPLUS
(3) Anon; Introducing Void Form International (Brochure) P13
(4) Ferry; US 3549116 1970
(5) Kell; US 3109217 1963
(6) Macdonald; US 1892311 1932
(7) Oliver; US 3358960 1967
(8) Raney; US 2881501 1959
(9) Reps; US 3857217 1974
(10) Robertella; US 5476216 1995
(11) Shuxteau; US 2718997 1955
(12) Shuxteau; US 3024513 1962
(13) Stark; US 3512747 1970
(14) Vassiliou; US 5273206 1993
(15) Viger; US 4827690 1989
(16) Workman; US 4685267 1987

L22 ANSWER 8 OF 9 CAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 1999:505202 CAPLUS
DOCUMENT NUMBER: 131:291084
ENTRY DATE: Entered STN: 16 Aug 1999
TITLE: Metal-Based X-ray Contrast Media
AUTHOR(S): Yu, Shi-Bao; Watson, Alan D.
CORPORATE SOURCE: Torsten Almen Research Center, Nycomed Amersham
Imaging, Wayne, PA, 19087, USA
SOURCE: Chemical Reviews (Washington, D. C.) (1999), 99(9),
2353-2377
CODEN: CHREAY; ISSN: 0009-2665
PUBLISHER: American Chemical Society
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English
CLASSIFICATION: 63-0 (Pharmaceuticals)
Section cross-reference(s): 8

ABSTRACT:

A review with 168 refs. Medical physics of x-ray contrast, metals, metal salts, and metal particulates, metal cluster complexes, organobismuth compds., and heavy metal complexes as x-ray contrast agents are discussed.

SUPPL. TERM: review metal x ray contrast media
INDEX TERM: Imaging agents
(contrast, radiog.; metal-based x-ray contrast media)
INDEX TERM: Metals, biological studies
ROLE: THU (Therapeutic use); BIOL (Biological study); USES
(Uses)

(metal-based x-ray contrast media)

REFERENCE COUNT: 226 THERE ARE 226 CITED REFERENCES AVAILABLE FOR THIS RECORD.

- REFERENCE(S):
- (1) Abbatt, J; Environ Res 1979, V18, P6 MEDLINE
 - (2) Abe, I; JP 90-104206 1990 CAPLUS
 - (3) Agocs, L; Inorg Chem 1997, V36, P2855 CAPLUS
 - (4) Agocs, L; J Am Chem Soc 1996, V118, P3225 CAPLUS
 - (5) Alizadeh, M; J Am Chem Soc 1985, V107, P2662 CAPLUS
 - (6) Almen, T; US 5482699 1996 CAPLUS
 - (7) Almen, T; Invest Radiol 1994, V29, PS37 CAPLUS
 - (8) Almen, T; Manuscript in preparation
 - (9) Almen, T; Theor Biol 1969, V24, P216 CAPLUS
 - (10) Andersson, M; J Clin Epidemiol 1993, V46, P637 MEDLINE
 - (11) Anon; Internal marketing reports
 - (12) Ardon, M; J Am Chem Soc 1982, V104, P5394 CAPLUS
 - (13) Artelt, H; Z Anorg Allg Chem 1992, V618, P18 CAPLUS
 - (14) Artelt, H; Z Anorg Allg Chem 1993, V619, P1 CAPLUS
 - (15) Bachem, C; Z Fhr Rontgenkunde 1910, V12, P369
 - (16) Balzer, T; New Developments in Contrast Agent research 1995, P129
 - (17) Bessman, S; Pediatrics 1954, V14, P201 CAPLUS
 - (18) Bianco, A; Radiology 1974, V112, P549 MEDLINE
 - (19) Bino, A; Inorg Chem 1978, V17, P3245 CAPLUS
 - (20) Bino, A; Inorg Chem 1988, V27, P3592 CAPLUS
 - (21) Binz, A; Urology 1931, V25, P297 CAPLUS
 - (22) Bloem, J; Radiology 1989, V171, P578 MEDLINE
 - (23) Briand, G; J Am Chem Soc 1998, V120, P11374 CAPLUS
 - (24) Burns, J; Bull Johns Hopkins Hosp 1916, V27, P157
 - (25) Bush, W; Am J Roentgen 1991, V157, P1153 MEDLINE
 - (26) Cacheris, W; Magn Reson Imaging 1990, V8, P467 CAPLUS
 - (27) Cannon, W; Am J Physiol 1898, V1, P359
 - (28) Casasco, A; Am J Neuroradiol 1994, V15, P1233 MEDLINE
 - (29) Chatterjee, G; J Appl Polym Sci 1995, V55, P851 CAPLUS
 - (30) Chatterjee, G; Polymer 1995, V36, P851
 - (31) Clement, O; Top Man Reson Imaging 1998, V9, P167 MEDLINE
 - (32) Contant, R; Inorganic Synthesis 1990, V27, P104 CAPLUS
 - (33) Corbett, J; J Alloys Compd 1995, V229, P10 CAPLUS
 - (34) Cotton, F; Inorg Chem 1967, V6, P11 CAPLUS
 - (35) Cotton, F; Inorg Chem 1984, V23, P4738 CAPLUS
 - (36) Cotton, F; Polyhedron 1986, V5, P3 CAPLUS
 - (37) Council on Pharmacy and Chemistry of the American Medical Association; J Am Med Assoc 1932, V99, P2193
 - (38) Curry, T; Christensen's Physics of Diagnostic Radiology 4th ed 1990
 - (39) Delaviz, Y; J Appl Polym Sci 1990, V40, P851
 - (40) Dickson, W; Can Med Assoc J 1932, V27, P125
 - (41) Dilley, R; Ann Otol Rhinol & Laryngol 1970, V79, P945 MEDLINE
 - (42) Dorey, J; Radiology 1993, V189(p), P242
 - (43) Dorman, W; Inorg Chem 1974, V13, P491 CAPLUS
 - (44) Downey, S; Unpublished results
 - (45) Dumont, A; Invest Radiol 1972, V7, P56 MEDLINE
 - (46) Dumont, A; Lymphology 1969, V2, P91 MEDLINE
 - (47) Ebihara, M; Inorg Chem 1994, V33, P2079 CAPLUS
 - (48) Editorial staff; Diagnostic Imaging Industry Report: Update 1996
 - (49) Edmunds, L; Invest Radiol 1970, V5, P131
 - (50) Ehrlich, G; Inorg Chem 1995, V34, P4454 CAPLUS
 - (51) Eisenberg, R; Diagnostic Imaging in Internal Medicine 1985
 - (52) Eisenberg, R; Morsby-Year Book

- (53) Eisenberg, R; Radiology An Illustrated History 1992
- (54) Engelbrecht, V; Fortschr Rontgenstr 1996, V165, P24
MEDLINE
- (55) Fijibayashi, Y; Biomed Res Trace Elem 1992, V3, P257
- (56) Fischer, H; Arch Pathol 1969, V88, P259 MEDLINE
- (57) Fischer, W; Am J Roentgen 1957, V77, P64
- (58) Fischer, W; Radiology 1957, V68, P488
- (59) Fobbe, F; Eur Radiol 1996, V6, P224 MEDLINE
- (60) Foreman, H; Br J Med 1955, V2, P678
- (61) Franolic, J; J Am Chem Soc 1995, V117, P8139 CAPLUS
- (62) Freedman, L; Chem Rev 1982, V82, P15 CAPLUS
- (63) Friedman, P; Radiology 1972, V104, P523 MEDLINE
- (64) Fryar, J; Proc SPIE Int Soc Op Eng 1990, V1231, P246
CAPLUS
- (65) Gamsu, G; Am Rev Respir Dis 1973, V107, P214 MEDLINE
- (66) Gamsu, G; Radiology 1973, V107, P151 MEDLINE
- (67) Gellermann, C; Mater Res Soc Symp Proc 1998, V520, P185
CAPLUS
- (68) Gianturco, L; Radiology 1996, V201(p), P314
- (69) Gibson, R; Clin Radiol 1993, V47, P278 MEDLINE
- (70) Goldberg, H; Am J Roentgen 1970, V110, P288 MEDLINE
- (71) Grainger, R; Br J Radiol 1982, V55, P1 CAPLUS
- (72) Hamm, B; Radiology 1995, V195, P785 MEDLINE
- (73) Havron, A; J Comput Assist Tomogr 1980, V4, P642
MEDLINE
- (74) Hendee, W; Medical Imaging Physics 3rd ed 1992
- (75) Hinchcliffe, W; Radiology 1970, V97, P327 MEDLINE
- (76) Hodali, H; Inorg Chim Acta 1992, V198-200, P245 CAPLUS
- (77) Hogue, R; Inorg Chem 1970, V9, P1354 CAPLUS
- (78) Hohenschun, E; Magnetic Resonance Imaging of the Body
3rd ed 1997, P1439
- (79) House, A; Radiographic Contrast Agents 1st ed 1977,
P411 CAPLUS
- (80) Hughes, B; Inorg Chem 1970, V9, P1343 CAPLUS
- (81) Humphreys, J; Health Phys 1998, V74, P442 CAPLUS
- (82) Hunter, S; Surgery 1949, V26, P682 CAPLUS
- (83) Ignatious, F; Polymer 1992, V33, P851
- (84) Ikari, S; Inorg Chem 1989, V28, P447 CAPLUS
- (85) Irwin, D; Can Med Assoc J 1932, V27, P130
- (86) Jackson, C; Am J Roentgen 1918, V5, P454
- (87) Janon, E; Am J Roentgen 1989, V152, P1348 MEDLINE
- (88) Janower, M; Radiology 1972, V103, P13 MEDLINE
- (89) Jeans, J; Eur J Nucl Med 1998, V25, P1469 MEDLINE
- (90) Kassabian, M; Roentgen Rays and Electrotherapeutics
1907
- (91) Katayama, H; Radiology 1990, V175, P621 MEDLINE
- (92) Katsoulis, D; Chem Rev 1998, V98, P359 CAPLUS
- (93) Katzberg, R; Radiology 1997, V204, P297 CAPLUS
- (94) Kaufman, J; Radiology 1996, V198, P579 MEDLINE
- (95) Kennedy, V; Inorg Chem 1994, V33, P5967 CAPLUS
- (96) Khalil, S; Acta Crystallogr 1978, VB34, P3751 CAPLUS
- (97) Kinno, Y; Am J Roentgen 1993, V160, P1293 MEDLINE
- (98) Kitamura, K; J Radioanal Nucl Chem 1997, V217, P175
CAPLUS
- (99) Klaveness, J; US 5817289 1998 CAPLUS
- (100) Kolesnichenko, V; Inorg Chem 1998, V37, P3660 CAPLUS
- (101) Krause, W; Invest Radiol 1996, V31, P30 CAPLUS
- (102) Krause, W; Invest Radiol 1996, V31, P502 CAPLUS
- (103) Krause, W; Radiology 1997, V205(p), P319
- (104) Krause, W; Visipaque (Iodixanol) package insert 1999
- (105) Kuhn, P; Inorg Chem 1965, V4, P1482 CAPLUS
- (106) Kumar, K; Inorg Chem 1993, V32, P587 CAPLUS
- (107) Lauffer, R; Chem Rev 1987, V87, P901 CAPLUS

- (108) Lerouge, S; J Biomed Mater Res 1996, V32, P627 CAPLUS
- (109) Link, D; Invest Radiol 1994, V29, P746 CAPLUS
- (110) Llusar, R; Inorg Chem 1994, V33, P849 CAPLUS
- (111) Loman, J; Am J Roentgen 1936, V35, P188
- (112) Long, J; US 5804161 1998 CAPLUS
- (113) Long, J; Angew Chem Int Ed 1995, V34, P226 CAPLUS
- (114) Long, J; J Am Chem Soc 1996, V118, P4603 CAPLUS
- (115) Lulei, M; J Am Chem Soc 1997, V119, P513 CAPLUS
- (116) Lumbroso, P; Med Phys 1987, V14, P752 CAPLUS
- (117) Macdonald, I; Can Med Assoc J 1932, V27, P136
- (118) Matchett, W; Radiology 1996, V201, P569 MEDLINE
- (119) McClennan, B; Invest Radiol 1994, V29, PS46
- (120) McClinton, L; J Pharmacol Exp Ther 1948, V94, P1
CAPLUS
- (121) McLachlan, S; Invest Radiol 1991, V27, PS12
- (122) Moniz, E; Rev Neurol 1931, V32, P646
- (123) Moniz, E; Roentgenpraxis 1932, V4, P90
- (124) Mussell, R; Inorg Chem 1990, V29, P3711 CAPLUS
- (125) Nadel, J; Invest Radiol 1968, V3, P229 MEDLINE
- (126) Nadel, J; Invest Radiol 1969, V4, P57 MEDLINE
- (127) Nadel, J; N Engl J Med 1970, V283, P281 MEDLINE
- (128) Nalbandian, R; Ann NY Acad Sci 1959, V78, P779 CAPLUS
- (129) Nasreldin, M; J Chem Soc 1990, P1765 CAPLUS
- (130) Novak, J; J Inorg Nucl Chem 1974, V36, P1061 CAPLUS
- (131) Olson, B; Invest Radiol 1983, V18, P177
- (132) Ono, N; Clin Imag 1995, V19, P229 MEDLINE
- (133) Osborne, E; J Am Med Assoc 1923, V80, P368 CAPLUS
- (134) O'Hare, N; J Phys Med Biol 1992, V37, P1519 MEDLINE
- (135) POV Inc; The Diagnostic Imaging Marketplace 1998
- (136) Palmisano, S; Radiology 1997, V203, P309 MEDLINE
- (137) Park, Y; Inorg Chem 1994, V33, P1705 CAPLUS
- (138) Pettersson, H; A Global Textbook of Radiology 1995
- (139) Platzek, J; Inorg Chem 1997, V36, P6086 CAPLUS
- (140) Pope, M; Heteropoly and Isopoly Oxometalates 1983, P31
- (141) Powell, G; Inorg Chem 1993, V32, P4021 CAPLUS
- (142) Qi, R; Inorg Chem 1994, V33, P5727 CAPLUS
- (143) Quinn, A; J Comput Assist Tomogr 1994, V18, P634
MEDLINE
- (144) Radt, P; Med Klin 1930, V26, P1889
- (145) Rawls, H; Dent Mater 1992, V8, P54 CAPLUS
- (146) Rhule, J; Chem Rev 1998, V98, P327 CAPLUS
- (147) Rocklage, S; Magnetic Resonance Imaging 2nd ed 1992,
P372
- (148) Roentgen, W; Sitzungsber Phys Med Ges Wurzburg 1895,
V137, PS132
- (149) Rubin, M; Ann NY Acad Sci 1959, V78, P764 CAPLUS
- (150) Rudnick, M; Kidney Int 1995, V47, P254 MEDLINE
- (151) Rumpel, T; Muenchen Med Wschr 1897, V44, P420
- (152) Rupp, K; Radiology 1997, V205(p), P338
- (153) Ruth, C; Med Phys 1995, V22, P1977 CAPLUS
- (154) Rutkowiak, B; Pol Arch Weter 1977, V20, P79 CAPLUS
- (155) Saito, K; JP 95-43527 1995 CAPLUS
- (156) Saito, T; Bull Chem Soc 1996, V69, P2403 CAPLUS
- (157) Saito, T; Inorg Chem 1989, V28, P3558
- (158) Sakane, G; ACS Symp Ser 1996, V653, P225 CAPLUS
- (159) Sandborg, M; Phys Med Biol 1995, V40, P1209 MEDLINE
- (160) Sapeika, N; Br J Med 1955, V2, P167 MEDLINE
- (161) Sargent, N; Am J Roentgen 1971, V113, P660 CAPLUS
- (162) Schelesinger, R; Invest Radiol 1975, V10, P115
- (163) Schild, H; Fortschr Rontgenstr 1994, V160, P218
MEDLINE
- (164) Schmitz, S; Invest Radiol 1995, V30, P644 CAPLUS
- (165) Schmitz, S; Radiology 1996, V201(p), P350

- (166) Schmitz, S; Radiology 1997, V202, P399 CAPLUS
- (167) Schmitz, S; Radiology 1997, V202, P407 CAPLUS
- (168) Schoonover, J; Inorg Chem 1996, V35, P6606 CAPLUS
- (169) Schuhmann-Giampieri, G; Acad Radiol 1998, V5, PS90
- (170) Schulz, H; Less-common Met 1970, V22, P136 CAPLUS
- (171) Schumann-Giampieri, G; J Clin Pharmacol 1997, V37, P587
- (172) Schumann-Giampieri, G; J Pharm Sci 1993, V82, P799
- (173) Schumann-Giampieri, G; Radiology 1992, V183, P59
- (174) Seigel, E; Acad Radiol 1996, V3, PS528
- (175) Seltzer, S; Int Congr Ser Excerpta Medica 1981, V561, P76 CAPLUS
- (176) Seltzer, S; Invest Radiol 1979, V14, P356
- (177) Seltzer, S; Invest Radiol 1979, V14, P400
- (178) Seltzer, S; J Comput Assist Tomogr 1981, V5, P370
MEDLINE
- (179) Shapiro, R; Acta Radiol 1956, V46, P635 CAPLUS
- (180) Shapiro, R; Am J Roentgen 1956, V76, P161 CAPLUS
- (181) Shapiro, R; Ann NY Acad Sci 1959, V78, P756 CAPLUS
- (182) Shapiro, R; Radiology 1955, V65, P429 CAPLUS
- (183) Shibahara, T; Advances in Inorganic Chemistry 1991, V37, P143 CAPLUS
- (184) Shibahara, T; Coord Chem Rev 1993, V123, P73 CAPLUS
- (185) Shibahara, T; Inorg Chem 1992, V31, P640 CAPLUS
- (186) Shibahara, T; J Am Chem Soc 1986, V108, P2757 CAPLUS
- (187) Skucas, J; Radiographic Contrast Agents 2nd ed 1989
- (188) Soares, A; J Chem Soc 1980, P1101 CAPLUS
- (189) Sovak, M; Invest Radiol 1994, V29, PS1
- (190) Spinosa, D; Radiology 1998, V209(p), P490
- (191) Springer, K; Prager Med Wochenschr 1906, V31, P162
- (192) Staks, T; Invest Radiol 1994, V29, P709 CAPLUS
- (193) Stitik, F; Ann Otol Rhinol Laryngol 1973, V82, P838
MEDLINE
- (194) Sunshine, J; Am J Roentgenol 1991, V157, P609 MEDLINE
- (195) Suzuki, H; WO 9506053 CAPLUS
- (196) Swick, M; Klin Wochenschr 1929, V8, P2087
- (197) Swick, M; Surg Clin N Am 1978, V58, P977 MEDLINE
- (198) Theoni, R; Radiology 1988, V167, P1
- (199) Thomas, S; Radiology 1951, V57, P669 CAPLUS
- (200) Thomas, S; Radiology 1962, V78, P435 MEDLINE
- (201) Tjernberg, B; Acta Radiol 1957, V47, P308 CAPLUS
- (202) Toth, E; Inorg Chem 1994, V33, P4070 CAPLUS
- (203) Uhle, A; Ann Surg 1910, V51, P546 MEDLINE
- (204) Uma, S; Inorg Chem 1998, V37, P1944 CAPLUS
- (205) Unger, E; Invest Radiol 1986, V21, P802 CAPLUS
- (206) Upham, T; Am J Roentgen 1971, V111, P690 MEDLINE
- (207) VanWagoner, M; Invest Radiol 1991, V26, P980 CAPLUS
- (208) Vehmas, T; Acta Radiol 1996, V37, P804 MEDLINE
- (209) Vehmas, T; Acta Radiol 1998, V39, P223 MEDLINE
- (210) Voelcker, F; Muench Med Wochenschr 1906, V53, P105
- (211) Von Sailer, R; Forstchr Rontgenstr 1973, V119, P727
- (212) Waters, C; Arch Intern Med 1917, V19, P538
- (213) Weinmann, H; Physiol Chem Phys Med NMR 1984, V16, P167
CAPLUS
- (214) Willer, M; Inorg Chem 1998, V37, P328 CAPLUS
- (215) Wuff, P; Fortschr Roentgenstr 1904, V8, P193
- (216) Yaghi, O; Inorg Chem 1992, V31, P4778 CAPLUS
- (217) Yamasaki, M; Inorg Chim Acta 1993, V205, P45 CAPLUS
- (218) Yater, W; Am J Roentgen 1933, V29, P172
- (219) Yu, S; 212th ACS National Meeting
- (220) Yu, S; Book of Abstracts 1996
- (221) Yu, S; Inorg Chim Acta 1997, V263, P61 CAPLUS
- (222) Zhang, X; Inorg Chem 1995, V34, P2678 CAPLUS

- (223) Zheng, Z; Inorg Chem 1997, V36, P5173 CAPLUS
 (224) Zheng, Z; J Am Chem Soc 1997, V119, P2163 CAPLUS
 (225) Zwicker, C; Fortschr Rontgenstr 1993, V158, P255
 MEDLINE
 (226) Zwicker, C; Invest Radiol 1991, V26, PS162 CAPLUS

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ABSTRACT:

A review with 233 refs. on the biosynthesis of secondary metabolites up to 1965 is presented. The earliest suggestions for three of the four major pathways were speculative; for the isoprene rule, hypotheses date to 1877, for the polyketide rule to 1907, and for a role for amino acids in alkaloid biosynthesis to 1910. The fourth major pathway based on intermediates of the shikimic acid pathway has a much shorter history because shikimic acid itself was only identified as a primary metabolite in 1951. In addition to speculation, biomimetic syntheses were carried out in which chemists attempted to duplicate possible biosynthetic pathways in vitro. The classic example was Robinson's synthesis of tropinone in 1917. Direct examination of secondary metabolite biosynthesis was possible with the use of the isotopic tracer technique. This methodol., applied extensively to primary metabolism beginning in 1935 and to secondary metabolism from about 1950, was facilitated by the increasing availability of the ¹⁴C isotope. With the use of isotopes as tracers, the broad outlines of secondary metabolite biosynthesis, reviewed here, were established in the period 1950 to 1965.

SUPPL. TERM: review secondary metabolite biosynthesis metabolic pathway
 INDEX TERM: Metabolism
 (anabolic; major pathways in the biosynthesis of
 secondary metabolites)
 INDEX TERM: Synthesis
 (biomimetic; major pathways in the biosynthesis of
 secondary metabolites of)
 INDEX TERM: Metabolic pathways
 (major pathways in the biosynthesis of secondary
 metabolites)
 INDEX TERM: Alkaloids, preparation
 Polyketides
 ROLE: BPN (Biosynthetic preparation); BIOL (Biological
 study); PREP (Preparation)
 (major pathways in the biosynthesis of secondary
 metabolites of)
 INDEX TERM: Radionuclides, preparation
 ROLE: BSU (Biological study, unclassified); SPN (Synthetic
 preparation); BIOL (Biological study); PREP (Preparation)
 (major pathways in the biosynthesis of secondary
 metabolites of)
 INDEX TERM: Amino acids, reactions
 ROLE: RCT (Reactant); RACT (Reactant or reagent)
 (major pathways in the biosynthesis of secondary

metabolites of)
INDEX TERM: Metabolic pathways
(shikimate pathway; major pathways in the biosynthesis of
secondary metabolites of)
INDEX TERM: 138-59-0P, Shikimic acid
ROLE: BPN (Biosynthetic preparation); BSU (Biological study,
unclassified); MFM (Metabolic formation); RCT (Reactant);
BIOL (Biological study); FORM (Formation, nonpreparative);
PREP (Preparation); RACT (Reactant or reagent)
(major pathways in the biosynthesis of secondary
metabolites of)
INDEX TERM: 532-24-1P, Tropinone
ROLE: BPN (Biosynthetic preparation); SPN (Synthetic
preparation); BIOL (Biological study); PREP (Preparation)
(major pathways in the biosynthesis of secondary
metabolites of)
REFERENCE COUNT: 235 THERE ARE 235 CITED REFERENCES AVAILABLE FOR THIS
RECORD.
REFERENCE(S): (1) Aberhart, D; Tetrahedron 1977, V33, P1545 CAPLUS
(2) Al-Rawi, J; Chem Comm 1974, P220 CAPLUS
(3) Anslow, W; Biochem J 1931, V25, P39 CAPLUS
(4) Arigoni, D; Biosynthesis of Terpenes and Sterols 1959,
P231 CAPLUS
(5) Arnstein, H; Biochem J 1953, V62, P403
(6) Arnstein, H; Biochem J 1953, V54, P493 CAPLUS
(7) Arnstein, H; Biochem J 1953, V54, P517 CAPLUS
(8) Arnstein, H; Biochem J 1953, V55, Pv MEDLINE
(9) Arnstein, H; Biochem J 1954, V57, P353 CAPLUS
(10) Arnstein, H; Biochem J 1954, V57, P360 CAPLUS
(11) Arnstein, H; Biochem J 1960, V76, P353 CAPLUS
(12) Arnstein, H; Biochem J 1960, V76, P357 CAPLUS
(13) Arnstein, H; Nature 1950, V166, P948 CAPLUS
(14) Arreguin, B; Arch Biochem 1951, V31, P234 CAPLUS
(15) Banko, G; J Am Chem Soc 1987, V109, P2858 CAPLUS
(16) Bassett, E; Biochim Biophys Acta 1960, V40, P535 CAPLUS
(17) Behrens, O; J Biol Chem 1948, V175, P765 CAPLUS
(18) Bennett, J; Advances in Applied Microbiology 1989, V34,
P1 CAPLUS
(19) Bentley, L; Nature 1952, V170, P847 CAPLUS
(20) Bentley, R; Ann Rev Biochem 1962, V31, P589 CAPLUS
(21) Bentley, R; Bact Proc, Abstract number P 59 1955, V55,
P130
(22) Bentley, R; Biochem J 1949, V45, P584 CAPLUS
(23) Bentley, R; Biogenesis og Antibiotic Substances 1965,
P241 CAPLUS
(24) Bentley, R; Chem Comm 1957, P20 CAPLUS
(25) Bentley, R; Crit Rev Biochem Mol Biol 1990, V25, P307
CAPLUS
(26) Bentley, R; Fed Proc, Abstract number 604 1954, V13,
P182
(27) Bentley, R; Fed Proc, Abstract program number, 279
1961, V20, P80
(28) Bentley, R; J Biol Chem 1957, V226, P673 CAPLUS
(29) Bentley, R; J Biol Chem 1957, V226, P703 CAPLUS
(30) Bentley, R; J Biol Chem 1963, V238, P1895 CAPLUS
(31) Bentley, R; J Chem Educ 1999, V76, P41 CAPLUS
(32) Bentley, R; Methods in Enzymology 1955, V1, P340 CAPLUS
(33) Bentley, R; Proc Chem Soc 1961, P111
(34) Bentley, R; Science 1955, V122, P330 CAPLUS
(35) Bentley, R; Trends in Biochem Sci 1985, V10, P171
(36) Bernfeld, P; Biogenesis of Natural Compounds 1963
(37) Birch, A; Ann Rev Plant Physiol 1968, V19, P321 CAPLUS
(38) Birch, A; Austral J Chem 1953, V6, P360 CAPLUS

- (39) Birch, A; Austral J Chem 1953, V6, P373 CAPLUS
- (40) Birch, A; Austral J Chem 1955, V8, P539 CAPLUS
- (41) Birch, A; Chem Ind 1955, P683 CAPLUS
- (42) Birch, A; Chem Ind 1958, P1321 CAPLUS
- (43) Birch, A; J Chem Soc 1958, P365 CAPLUS
- (44) Birch, A; J Chem Soc 1958, P369 CAPLUS
- (45) Birch, A; J Chem Soc 1958, P4582 CAPLUS
- (46) Birch, A; Journal and Proceedings, Royal Society of New South Wales 1976, V109, P151
- (47) Birch, A; Nature 1953, V172, P902 CAPLUS
- (48) Birch, A; Perspectives in Organic Chemistry 1956, P134
- (49) Birch, A; Proc Chem Soc 1957, P233 CAPLUS
- (50) Birch, A; To See the Obvious 1995
- (51) Birkinshaw, J; Biochem J 1932, V26, P441 CAPLUS
- (52) Birkinshaw, J; Biochem J 1942, V36, P242 CAPLUS
- (53) Blackwood, A; Can J Microbiol 1957, V3, P165 CAPLUS
- (54) Bloch, K; Science 1965, V150, P19 MEDLINE
- (55) Bonner, J; J Chem Educ 1949, V26, P628 CAPLUS
- (56) Bowden, K; Can J Chem 1951, V29, P1037 CAPLUS
- (57) Brown, S; J Am Chem Soc 1952, V74, P1523 CAPLUS
- (58) Buchanan, J; Physiol Revs 1946, V26, P120 CAPLUS
- (59) Bu'Lock, J; Advances in Applied Microbiology 1961, V3, P293 CAPLUS
- (60) Bu'Lock, J; Proc Chem Soc 1961, P209 CAPLUS
- (61) Bu'Lock, J; The Biosynthesis of Natural Products An Introduction to Secondary Metabolism 1965
- (62) Cane, D; Polyketide and Nonribosomal Polypeptide Biosynthesis Chem Revs 1997, V97, P2463 CAPLUS
- (63) Claisen, L; Ber deutsch chem Gasellschaft 1891, V24, P120
- (64) Clarke, H; The Chemistry of Penicillin 1949
- (65) Cleland, W; J Biol Chem 1954, V208, P679 CAPLUS
- (66) Collie, J; J Chem Soc 1893, V63, P329 CAPLUS
- (67) Collie, J; J Chem Soc 1907, V91, P1806 CAPLUS
- (68) Collie, J; Proc Chem Soc 1907, V23, P230
- (69) Corcoran, J; Biosynthesis of Antibiotics 1966, VI, P159
- (70) Corcoran, J; J Biol Chem 1960, V235, PPC29 CAPLUS
- (71) Corzo, R; Fed Proc, Abstract number 1544 1953, V12, P470
- (72) Corzo, R; Ph D thesis, Stanford University 1953
- (73) Curtis, R; Biochem J 1964, V90, P43 CAPLUS
- (74) Dauben, W; J Am Chem Soc 1956, V78, P5329 CAPLUS
- (75) Dauben, W; J Am Chem Soc 1957, V79, P1000 CAPLUS
- (76) Dauben, W; J Am Chem Soc 1957, V79, P968 CAPLUS
- (77) Davies, J; Secondary Metabolites: Their Function and Evolution, Ciba Foundation Symposium 171 1992, P21
- (78) Davis, B; Adv Enzymol 1955, V16, P247 CAPLUS
- (79) Davis, B; J Biol Chem 1951, V191, P315 CAPLUS
- (80) Demain, A; Adv Appl Microbiol 1973, V16, P177 CAPLUS
- (81) Demain, A; Secondary Metabolites: Their Function and Evolution, Ciba Foundation Symposium 171 1992, P3 CAPLUS
- (82) Dewar, M; Nature 1945, V155, P50 CAPLUS
- (83) Diaper, D; Can J Chem 1951, V29, P964 CAPLUS
- (84) Dubeck, M; J Biol Chem 1952, V199, P307 CAPLUS
- (85) Dugan, J; J Am Chem Soc 1966, V88, P2838 CAPLUS
- (86) Ehrensvar, G; Main Lectures, XVIIth International Congress of Pure and Applied Chemistry 1960, VII, P99
- (87) Eschenmoser, A; Biogenesis of steroids and terpenic compounds P362
- (88) Eschenmoser, A; Helv Chim Acta 1955, V38, P1890 CAPLUS
- (89) Evans, G; Further Perspectives in Organic Chemistry

Ciba Foundation Symposium, 53 1978

- (90) Fischer, H; Helv Chim Acta 1935, V18, P1206 CAPLUS
- (91) Fischer, H; Helv Chim Acta 1937, V20, P705 CAPLUS
- (92) Florey, H; The Lancet 1946, P46
- (93) Florkin, M; Comprehensive Biochemistry 1979, V33A, P171
- (94) Florkin, M; Comprehensive Biochemistry 1979, V33A, P29
- (95) Floss, H; J Natl Prod 1986, V6, P957
- (96) Floss, H; The Shikimic Acid Pathway Recent Advances in
Phytochemistry 1986, V20, P13 CAPLUS
- (97) Folkers, K; Biosynthesis of Terpenes and Sterols 1959,
P20 CAPLUS
- (98) Franck, B; Naturwiss 1960, V47, P169 CAPLUS
- (99) Friedman, S; J Biol Chem 1964, V239, P2386 MEDLINE
- (100) Fruton, J; Molecules and Life Historical Essays on the
Interplay of Chemistry and Biology 1972
- (101) Gatenbeck, S; Acta Chem Scand 1959, V13, P1561 CAPLUS
- (102) Gatenbeck, S; Acta Chem Scand 1960, V14, P230 CAPLUS
- (103) Gatenbeck, S; Acta Chem Scand 1960, V14, P296
- (104) Gatenbeck, S; Acta Chem Scand 1965, V19, P65 CAPLUS
- (105) Geismann, T; Chem Ind 1957, P984
- (106) Geismann, T; Organic Chemistry of Secondary Plant
Metabolism 1969, P6
- (107) Gerber, N; Can J Chem 1978, V56, P1155 CAPLUS
- (108) Gerzon, K; J Am Chem Soc 1956, V78, P6396 CAPLUS
- (109) Gower, B; J Am Chem Soc 1963, V85, P3683 CAPLUS
- (110) Grisebach, H; Zeit Naturforsch 1957, V12B, P227 CAPLUS
- (111) Grisebach, H; Zeit Naturforsch 1960, V15B, P560 CAPLUS
- (112) Grisebach, H; Zeit Naturforsch 1962, V17B, P64 CAPLUS
- (113) Gulland, J; J Chem Soc 1923, V123, P980 CAPLUS
- (114) Gulland, J; Memoirs Proceedings Manchester Literary
and Philosophical Society 1924-1925, V69, P79
- (115) Haas, P; An Introduction to the Chemistry of Plant
Products 1913
- (116) Hall, E; Chem Comm 1966, P348 CAPLUS
- (117) Hall, J; Chem Rev 1933, V13, P479 CAPLUS
- (118) Hall, J; Chem Rev 1937, V20, P305 CAPLUS
- (119) Harris, T; Fortschritte der Chemie organischen
Naturstoffe 1974, V31, P217 CAPLUS
- (120) Haslam, E; Metabolites and Metabolism A Commentary on
Secondary Metabolism 1985
- (121) Haslam, E; Shikimic Acid Metabolism and Metabolites
1993
- (122) Hassall, C; Biogenesis of Antibiotic Substances 1965,
P51 CAPLUS
- (123) Hassall, C; J Chem Soc 1959, P2831
- (124) Heilbron, I; J Chem Soc 1926, V129, P1630
- (125) Hevesy, G; Cold Spring Harbor Symposia on Quantitative
Biology 1948, VXIII, P129
- (126) Hobby, G; Pencillin: Meeting the Challenge 1985
- (127) Howell, S; Science 1948, V107, P299 CAPLUS
- (128) Hubbard, R; Biochem J 1950, V46, P220 CAPLUS
- (129) Hunter, G; Biochem J 1954, V58, P249 CAPLUS
- (130) Hunter, G; Biochem J 1955, V59, P268 CAPLUS
- (131) Hutchinson, C; Ann Rev Microbiol 1995, V49, P201
CAPLUS
- (132) Jenssen, E; Acta Chem Scand 1956, V10, P1047 CAPLUS
- (133) Kaneda, T; Fed Proc 1961, V20, P273
- (134) Karow, E; J Am Chem Soc 1952, V74, P3056 CAPLUS
- (135) Keil, J; Fed Proc, Abstract program number 1722 1960,
V19, P242
- (136) Keil, J; Fed Proc, Abstract program number 280 1961,
V20, P80
- (137) Kikuchi, M; Bot Mag Tokyo 1961, V74, P463 CAPLUS

- (138) Kirkwood, S; Can J Chem 1951, V29, P30 CAPLUS
- (139) Kohler, R; J Hist Biol 1975, V8, P275 MEDLINE
- (140) Kusai, K; Biochim Biophys Acta 1960, V40, P555 CAPLUS
- (141) Leete, E; Adv Enzymol 1969, V32, P373 CAPLUS
- (142) Leete, E; Biogenesis of Natural Compounds 1963, P739
- (143) Leete, E; Nature 1954, V174, P650 CAPLUS
- (144) Lemke, P; Cephalosporins and Pencillins Chemistry and Biology 1972, P370 CAPLUS
- (145) Lesaint, C; Compt Rend 1962, P1002 CAPLUS
- (146) Lipmann, F; The Harvey Lectures Series XLIV 1948-1949, P99
- (147) Louden, M; J Am Chem Soc 1962, V84, P1510 CAPLUS
- (148) Lynen, F; Angew Chem 1961, V73, P513 CAPLUS
- (149) Lynen, F; J Cell Comp Physiol 1959, V54(Suppl 1), P33 CAPLUS
- (150) Maass, E; J Bacteriol 1949, V57, P415 CAPLUS
- (151) Macdonald, J; Antibiotics, Biosynthesis 1967, VII, P43
- (152) Macdonald, J; Antibiotics, Biosynthesis 1967, VII, P52
- (153) Martin, E; J Biol Chem 1953, V203, P239 CAPLUS
- (154) McCormick, J; Biogenesis of Antibiotic Substances 1965, P73 CAPLUS
- (155) McCormick, J; J Am Chem Soc 1958, V80, P5572 CAPLUS
- (156) Money, T; Chem Rev 1970, V70, P553 CAPLUS
- (157) Morris, C; Academic Press Dictionary of Science and Technology 1992, P262
- (158) Morris, D; J Biol Chem 1966, V241, P1763 CAPLUS
- (159) Mosbach, K; Acta Chem Scand 1960, V14, P457 CAPLUS
- (160) Mosbach, K; Naturwiss 1961, V15, P525
- (161) Mosbach, K; Zeit Naturforsch 1959, V14B, P69 CAPLUS
- (162) Mothes, K; I Angewandte Chemie, Int Ed English 1963, V2, P341
- (163) Mothes, K; II Angewandte Chemie, Int Ed English 1963, V2, P441
- (164) Muller, D; I Biochem Zeit 1928, V199, P136 CAPLUS
- (165) Nair, P; Biochim Biophys Acta 1965, V96, P318 MEDLINE
- (166) Nes, W; Biochemistry of Steroids and Other Isoprenoids 1977
- (167) Nicholas, H; Biogenesis of Natural Compounds 1963, P641
- (168) Ollis, W; Proc Chem Soc 1960, P347 CAPLUS
- (169) Orchin, M; The Vocabulary of Organic Chemistry 1980, P456
- (170) Paech, K; Biochemie und Physiologie der Sekundaren Pflanzenstoffe 1950
- (171) Pavia, N; J Indust Microbiol 1993, V12, P423
- (172) Pelletier, S; Alkaloids-Chemical and Biological Perspectives 1983, V1, P2
- (173) Polanyi, M; Trans Faraday Soc 1934, V30, P508 CAPLUS
- (174) Porter, J; Biosynthesis of Isoprenoid Compounds 1981, V1
- (175) Porter, J; Biosynthesis of Isoprenoid Compounds 1983, V2
- (176) Raistrick, H; Biochem J 1919, V13, P329 CAPLUS
- (177) Raper, H; J Chem Soc 1907, P1831 CAPLUS
- (178) Raphael, R; Royal College of Science Journal 1948, VXXVIII, P42
- (179) Read, G; Chem Ind 1959, P1547 CAPLUS
- (180) Rittenberg, D; J Biol Chem 1940, V136, P799 CAPLUS
- (181) Rittenberg, D; J Biol Chem 1944, V154, P311 CAPLUS
- (182) Rittenberg, D; J Biol Chem 1945, V160, P417 CAPLUS
- (183) Roberts, W; Phil Trans Roy Soc 1874, V164, P457
- (184) Robinson, R; Annual Reports on the Progress of

Chemistry for 1923 1924, VXX, P100

- (185) Robinson, R; Biosynthesis of Terpenes and Sterols, Ciba Foundation Symposium 1959, P302
- (186) Robinson, R; Chem Ind 1934, P1062 CAPLUS
- (187) Robinson, R; J Chem Soc 1917, V111, P762 CAPLUS
- (188) Robinson, R; J Chem Soc 1917, V111, P876 CAPLUS
- (189) Robinson, R; J Chem Soc 1936, P1079 CAPLUS
- (190) Robinson, R; J Royal Soc Arts 1948, V96, P795
- (191) Robinson, R; The Structural Relations Of Natural Products 1955, P5
- (192) Rowley, D; Biochem J 1950, V46, P157 CAPLUS
- (193) Ruhland, W; Encyclopedia of Plant Physiology, The Metabolism of Secondary Plant Products 1958, VX
- (194) Ruzicka, L; Experientia 1953, V9, P357 CAPLUS
- (195) Ruzicka, L; J Chem Soc 1932, P1582 CAPLUS
- (196) Ruzicka, L; Proc Chem Soc 1959, V341
- (197) Sandermann, W; Fette, Seifen, Anstrichmittel 1957, V59, P852 CAPLUS
- (198) Schlegel, H; General Microbiology, 6th ed 1986, P340
- (199) Schoenheimer, R; The Dynamic State of Body Constituents, 2nd ed 1946
- (200) Schopf, C; Justus Liebigs Annalen Chemie 1935, V518, P1 CAPLUS
- (201) Scott, A; Chem Comm 1967, P945 CAPLUS
- (202) Sebek, O; Proc Soc Exp Biol Med 1953, V84, P170 CAPLUS
- (203) Shannon, L; Nature 1959, V183, P683 CAPLUS
- (204) Simpson, T; Biosynthesis, Polyketides and Vitamins, Topics in Current Chemistry 1998, V195, P1 CAPLUS
- (205) Smith, A; Oxford Dictionary of Biochemistry and Molecular Biology 1997
- (206) Stermitz, F; J Am Chem Soc 1961, V83, P4045 CAPLUS
- (207) Stevens, C; J Biol Chem 1954, V211, P297 CAPLUS
- (208) Stewart, A; 7th edition 1948, VII, P408
- (209) Stewart, A; Recent Advances in Organic Chemistry, 4th ed 1920, P262
- (210) Suhadolnik, R; J Am Chem Soc 1958, V80, P4391 CAPLUS
- (211) Tamura, G; J Gen Appld Microbiol (Tokyo) 1956, V2, P431 CAPLUS
- (212) Tanabe, M; Biosynthesis, A Specialist Periodical Report 1973, V2, P241 CAPLUS
- (213) Tanabe, M; J Am Chem Soc 1966, V88, P4515 CAPLUS
- (214) Tanenbaum, S; Biochim Biophys Acta 1962, V59, P524 CAPLUS
- (215) Tatum, E; Ann Rev Biochem 1944, V13, P667 CAPLUS
- (216) Tatum, E; J Biol Chem 1951, V190, P843 CAPLUS
- (217) Tatum, E; Proc Natl Acad Sci USA 1954, V40, P271 CAPLUS
- (218) Tilden, W; Chem News 1882, V46, P120
- (219) Tilden, W; J Chem Soc 1884, V45, P410 CAPLUS
- (220) Tome, J; J Biol Chem 1953, V203, P251 CAPLUS
- (221) van Baalen, C; Bacteriol Proc, Abstract P 101 1955, V55, P143
- (222) van Tamelen, E; Fortschritte der Chemie organischer Naturstoffe 1961, V19, P242 CAPLUS
- (223) Vanek, Z; Folia Microbiol 1961, V6, P408 CAPLUS
- (224) Vanek, Z; Proceedings 2nd UN International Conference on the Peaceful Uses of Atomic Energy 1958, V25, P143
- (225) Watkin, J; J Biochem Physiol 1957, V35, P229 CAPLUS
- (226) Weiss, U; The Biosynthesis of Aromatic Compounds 1980, P95
- (227) Wenkert, E; Experientia 1959, V15, P165 CAPLUS
- (228) Williams, C; Phil Trans Roy Soc 1860, V150, P241

- (229) Willstatter, R; Justus Liebigs Annalen Chemie 1903,
V326, P23 CAPLUS
- (230) Wilsmore, N; Nature 1907, V75, P510
- (231) Winstead, J; J Am Chem Soc 1960, V82, P1644 CAPLUS
- (232) Winterstein, E; Die Alkaloide Eine Monographie der
natürlichen Basen 1910
- (233) Wood, H; J Biol Chem 1940, V135, P789 CAPLUS
- (234) Woodward, R; Angew Chem 1956, V68, P13 CAPLUS
- (235) Woodward, R; J Am Chem Soc 1953, V75, P2023 CAPLUS

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ENTRY	SESSION
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